MAY 30 1987

FLOOD INSURANCE STUDY

ORIGINAL

CITY AND COUNTY OF HONOLULU, HAWAII

VOLUME 2 OF 3

SEPTEMBER 4, 1987

Federal Emergency Management Agency

COMMUNITY NUMBER - 150001

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NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for flood plain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and flood plain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year flood plains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For flood plain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year flood plains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

Numerous Flood Hazard Area Reports, Flood Insurance Studies, and Flood Plain Information Reports were used in the preparation of this Flood Insurance Study. Most of the past studies were computed without the aid of a computer, and the few that were run on the computer utilized an earlier version of the currently used HEC-2 computer program. Other than the degree of accuracy between manual and computer computation, and the variation in computer programs used, other possible causes of variation from the previously published data may be from differences in assumptions made and physical changes to the terrain, such as recent flood-control projects, which may affect the hydraulic computations.

One prior flood report for Makiki Stream has been prepared (Reference 37). The 1967 City and County of Honolulu Makiki Stream report proposed channel improvements within the length of study to accommodate a discharge of 5,000 cfs, almost a tenfold increase from the present capacity of 510 cfs. Water-surface elevations and flooding under present channel conditions were not developed for the aforementioned report.

For Manoa Stream, the Manoa-Palolo Drainage Channel, and Palolo Stream waterways, several studies have been prepared. The first report, a 1965 COE survey on flood control in the Manoa and Palolo Valleys, summarized the existing and proposed flood-control measures for these watersheds (Reference 38). While no hydraulic and hydrologic bases of comparison are presented, the flood-control history of the areas is well-documented. The second, the 1971 Flood Insurance Study for Moiliili-Waikiki (Type 10) by R.M. Towill Corporation, presented the FIA 1971 version of flood insurance zoning (Reference 39). The results of that report are superseded by this FEMA-guided Flood Insurance Study. The third report is the Manoa Stream Park Conceptual Plan (Reference 40).

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As the result of an advisory committee comprised of local (City and County of Honolulu and State) agencies, community associations, and Federal (COE) authority, the conceptual plan presented the development scheme for the future. The fourth and most recent flood study is the 1977 Flood Hazard Study for the Manoa Stream basin (Reference 41). A HEC-2 backwater analysis was performed for the report, from King Street to Paradise Park. The present study utilizes the exact hydrologic and hydraulic data from the 1977 Flood Hazard Study and added the segment from King Street to the Ala Wai Canal, defined as the Manoa-Palolo Drainage Canal. Thus, the results for the common areas are identical.

For the Ala Wai Canal, no direct flood study has been conducted. Past studies were performed for dredging to maintain the water quality and the stream-carrying capacity of the canal. The most recent dredging studies provide a determination of the dredged capacity of the canal (References 42 and 43). The dredged capacity of 13,000 cfs is reported to be the 10-year floodflow capacity. For this study, the 10-year discharge is 12,970 cfs at the confluence of Moiliili Drain and the Ala Wai Canal.

A Flood Insurance Study was prepared in 1975 by the COE for FEMA and the City and County of Honolulu. The study utilized detailed and approximate methods and included, by the approximate method, the following 12 streams.

Nuuanu Stream

Existing studies for this area were done many years ago by the COE. The basic data is now unavailable.

Waolani Stream

Existing studies for this area were done many years ago by the COE. The basic data is now unavailable.

Kalihi Stream

In 1972, the COE and the Department of Land and Natural Resources (DLNR) of the State of Hawaii produced the Kalihi-Moanalua Flood Hazard Area, Kalihi, Oahu, Hawaii, Map, FP-8 (Reference 16). The map includes flood outlines and elevations and calculated floodflows for the 50-year and 100-year floods and the Standard Project Flood Peak Discharges for Kalihi Stream from King Street to the stream mouth. The log-Pearson Type III method was used to determine these flows, using USGS gaging station data. The flows are presented below:

	Q_{50} (cfs)	Q_{100} (cfs)	Standard Project (cfs)
Kalihi Stream at Mouth	15,000	17,000	25,000

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In 1977 the COE completed the Flood Hazard Study, Kalihi Stream and Kamanaiki Stream, Oahu, Hawaii (Reference 33). The study determined the flooding hazard from School Street into the upper portion of the Kalihi Stream watershed.

A Flood Insurance Study (Type 15) for the Kalihi-Moanalua Area, Island of Oahu, Hawaii, was prepared for FEMA in 1971 (Reference 36). Flood profiles and stages were provided but no flow data. Supporting data is no longer available.

Aiea Stream

In 1971 the COE prepared the Flood Insurance Study, (Type 10), Aiea Area, Island of Oahu, Hawaii (Reference 44) for FEMA. Flood profiles were provided but no flows were given. Supporting data is no longer available.

Kalauao Stream

In 1971 the COE and the DLNR produced the Kalauao Flood Hazard Area, Kalauao, Oahu, Hawaii, Map FP-7 (Reference 45). The map provided flood outlines, and elevations, and frequency curves for the 50- and 100-year peak discharges. No standard Project Flood Peak Discharge was calculated due to ongoing construction of the H-1 Freeway berm.

Waikele Stream

In 1982 the COE prepared the Waikele Stream, Flood Management Study, Waipahu, Oahu, Hawaii (Reference 46). The study provided flood profiles and a floodflow frequency curve.

Kaalaea, Haiamoa, Waihee, Kahaluu and Ahuimanu Streams

In 1969 the SCS and the City and County of Honolulu prepared the Watershed Work Plan, Kahaluu Watershed (Reference 47). The work plan provided flood profiles as well as design flows.

Complete hydrologic or hydraulic data is not available for Kaalaea and Haiamoa.

Stream gage data for Waihee, Kahaluu and Ahuimanu is available from the USGS.

Kawainui Stream

In 1971 the COE prepared for FEMA a Flood Insurance Study (Type 10), Kailua, Oahu, Hawaii (Reference 12). Flood profiles and stages were given.

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8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Building 105, Presidio of San Francisco, San Francisco, California 94129.

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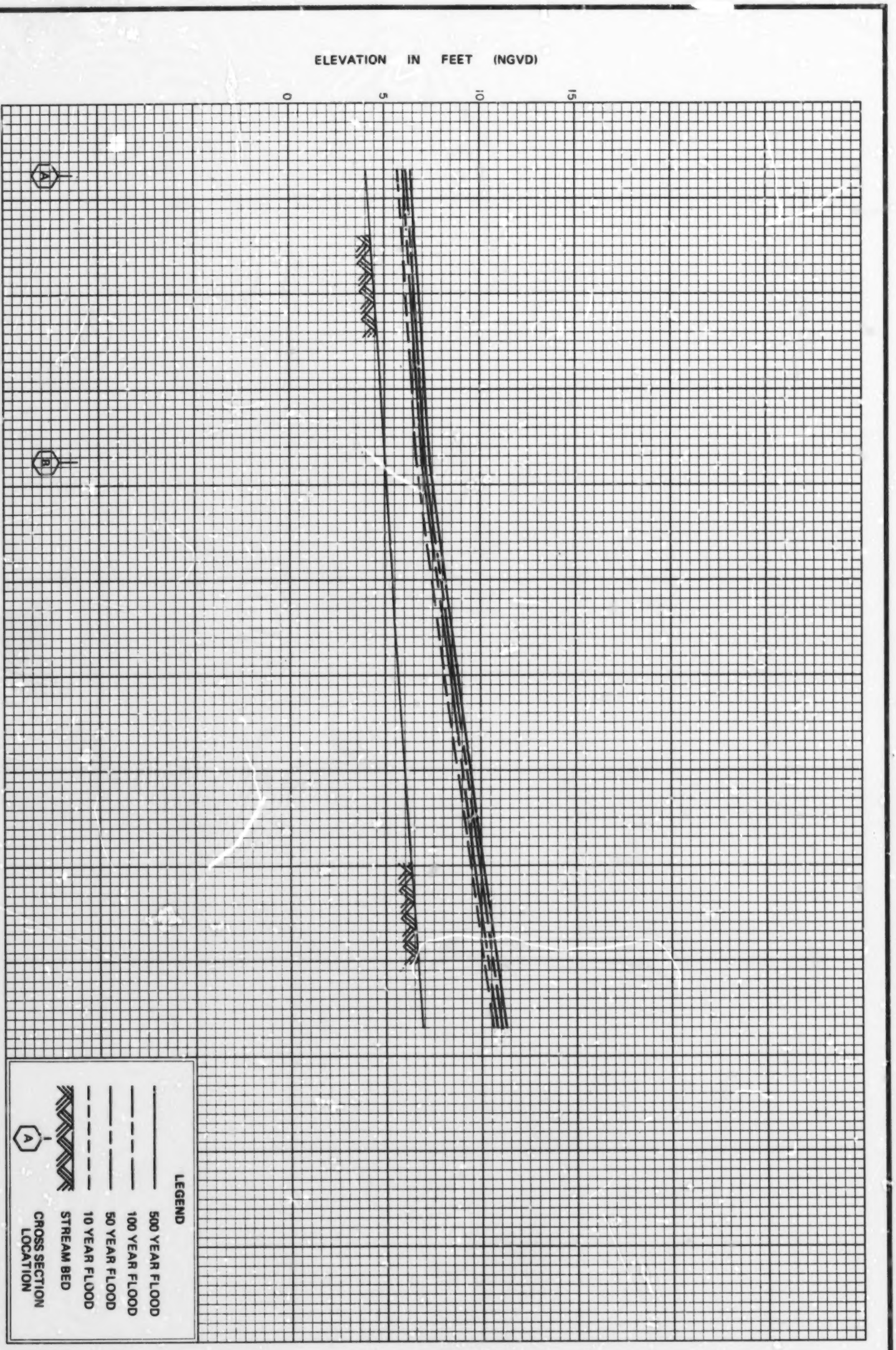

01P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY AND COUNTY OF HONOLULU, HI	FLOOD PROFILES HOOLAPA STREAM

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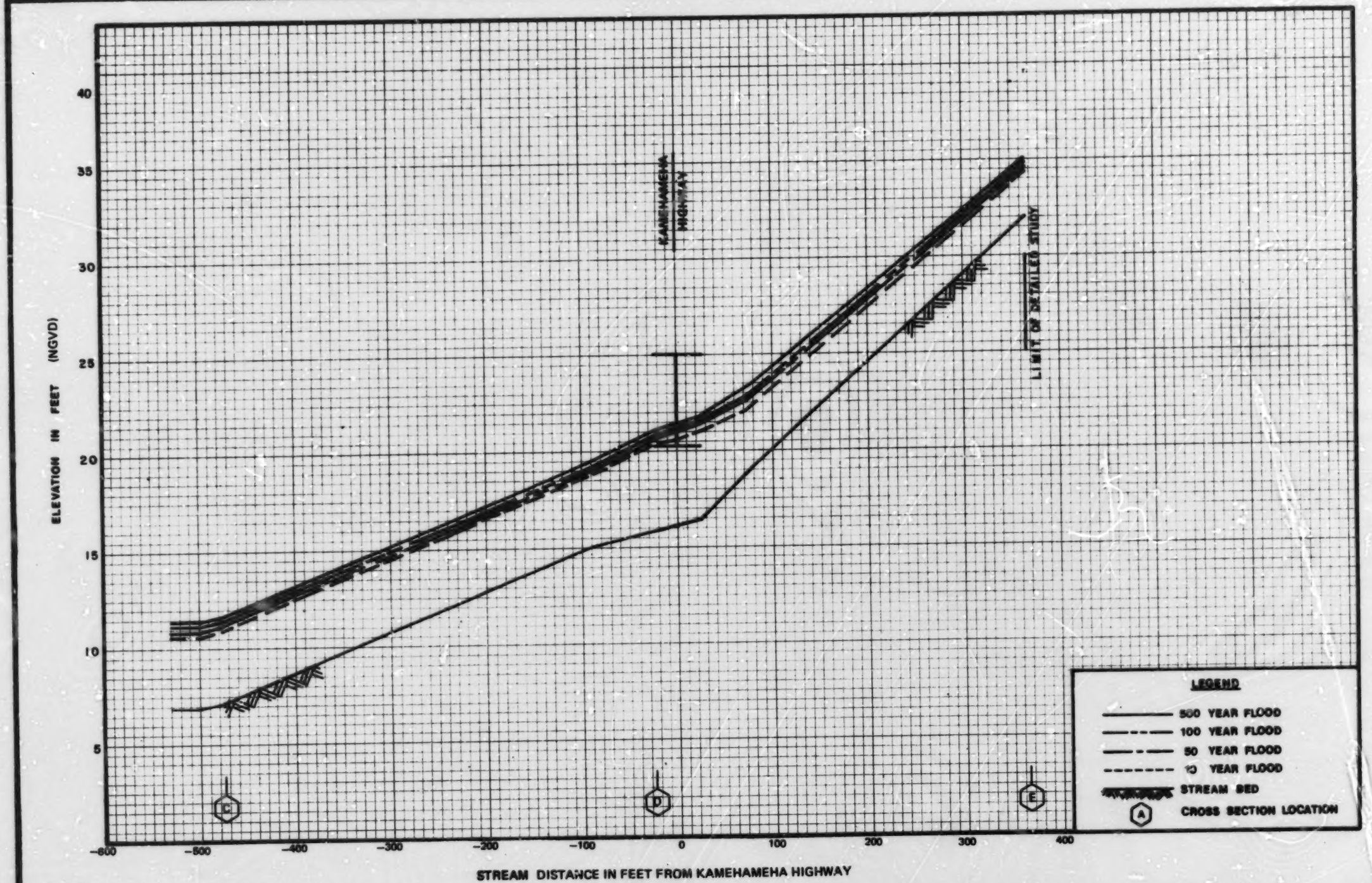

FLOOD PROFILES

HOOLAPA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

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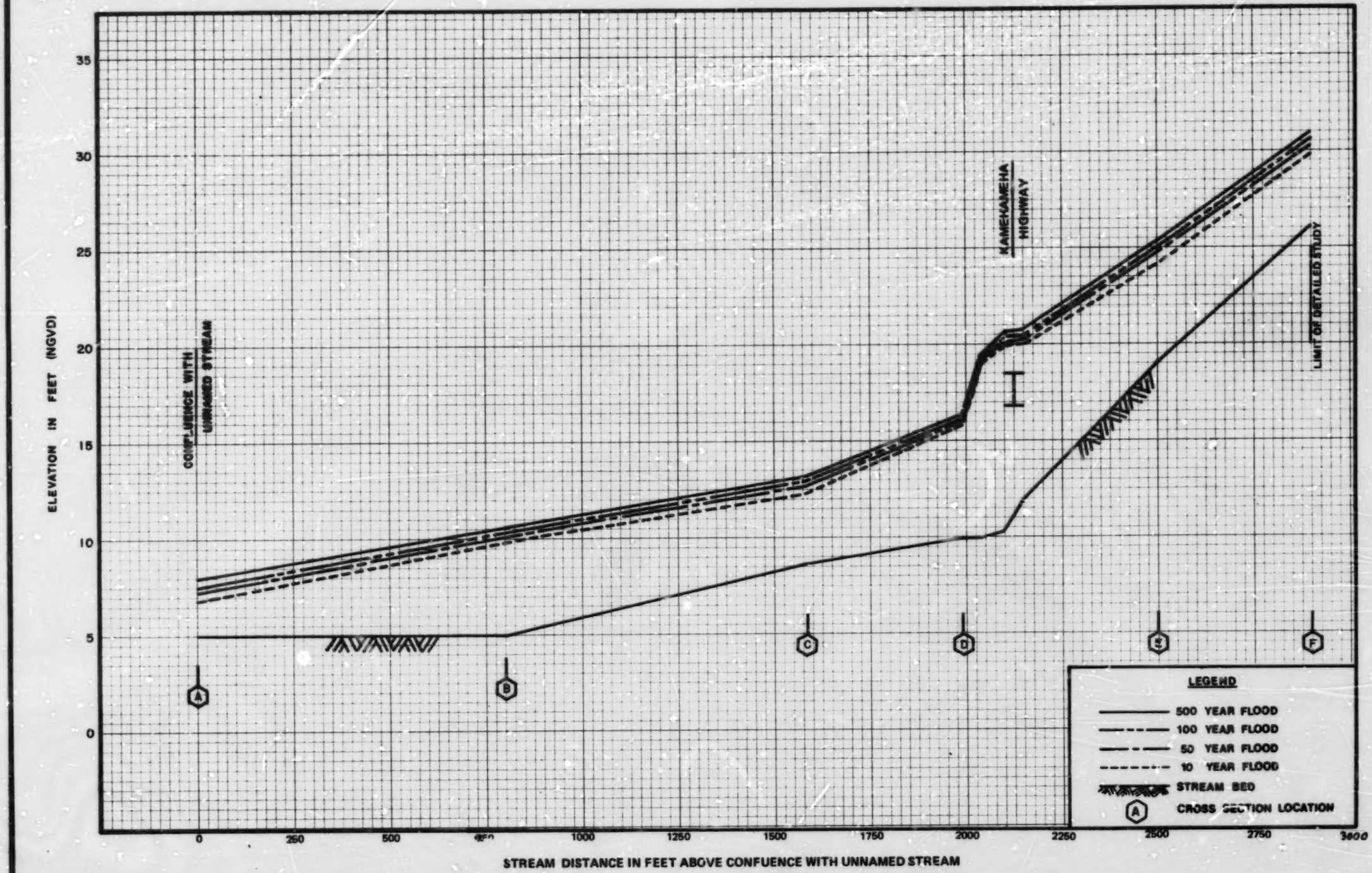

FLOOD PROFILES

KALAEOKAHIPA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

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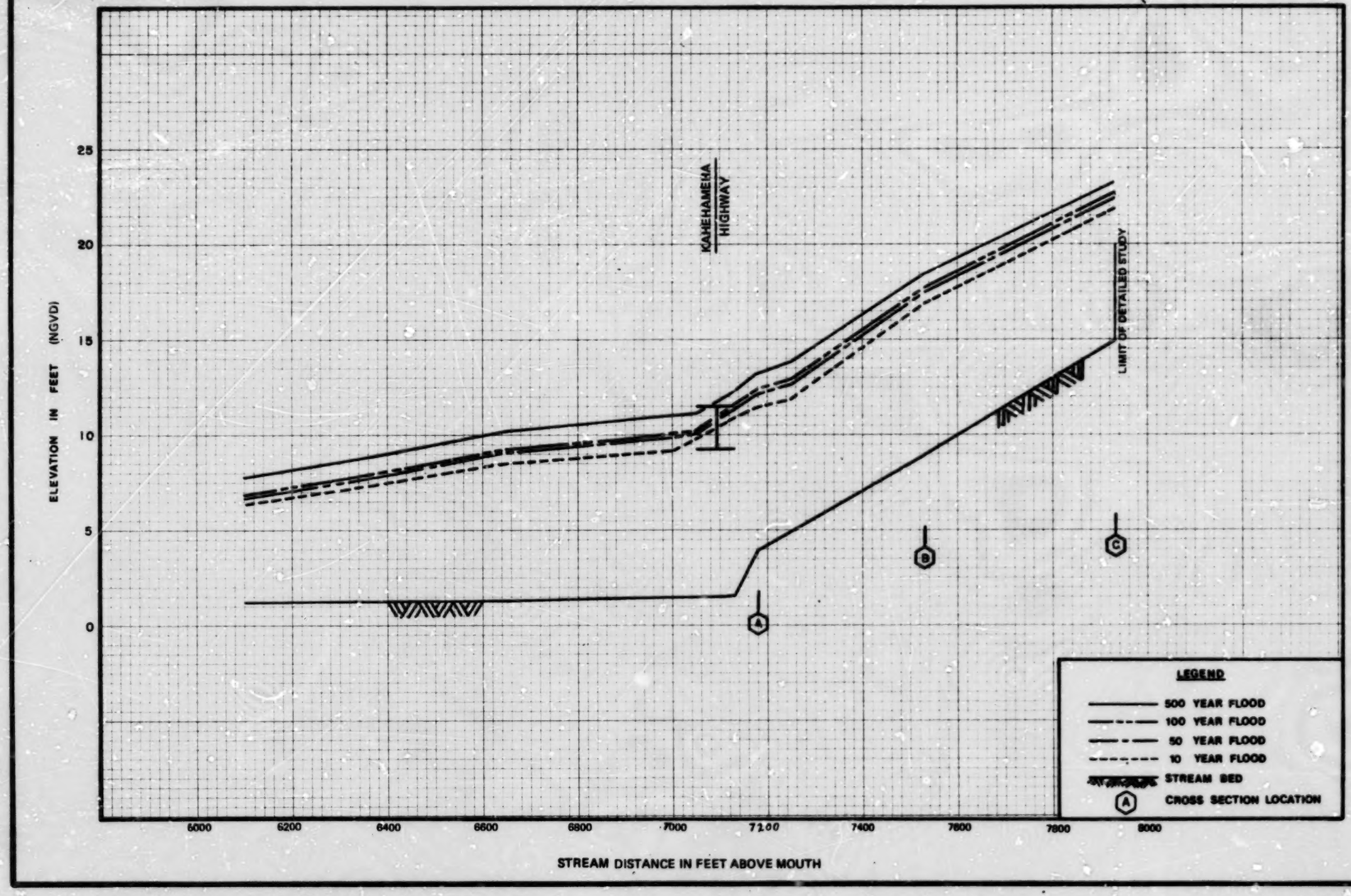

FLOOD PROFILES

OHIA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

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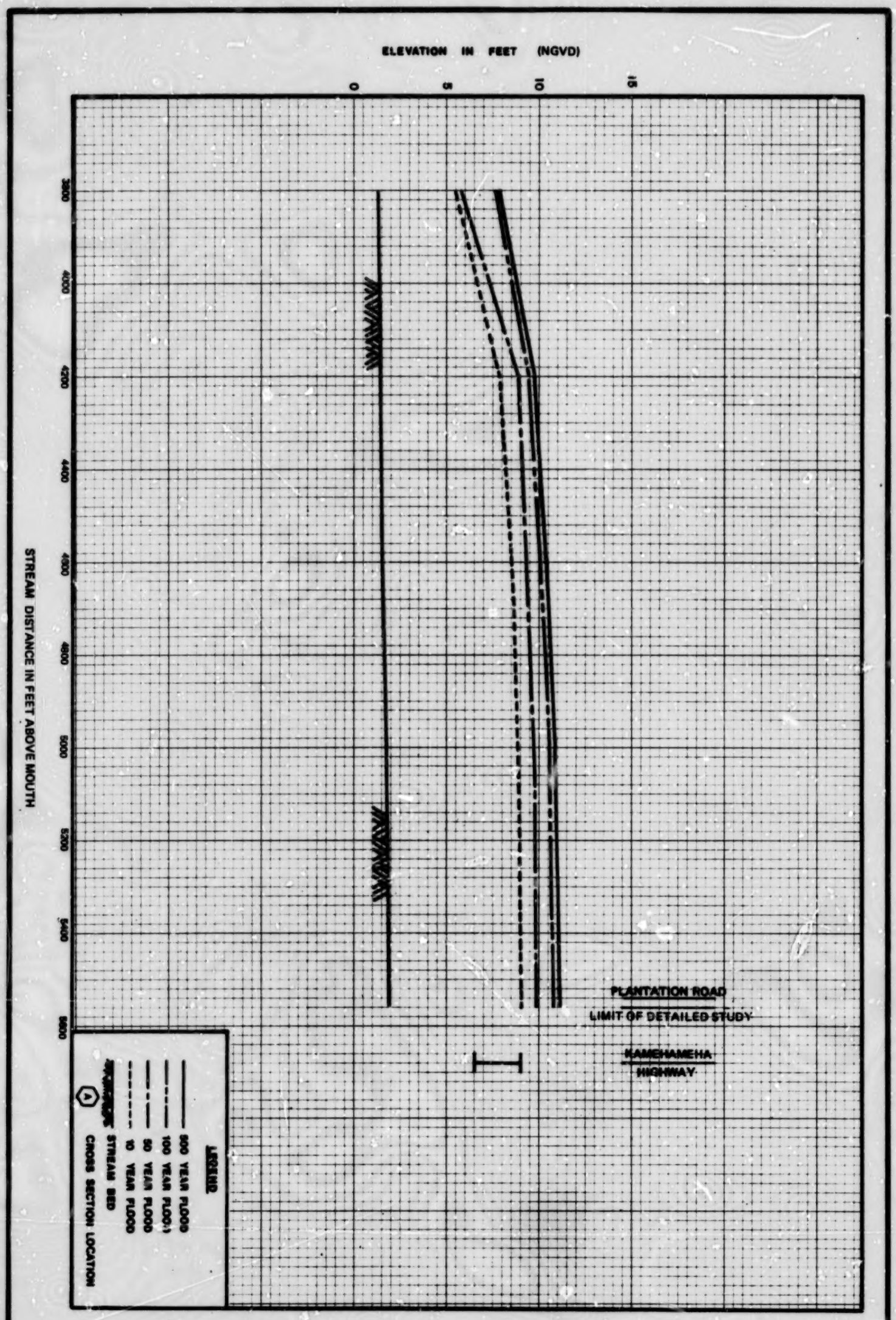

05P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY AND COUNTY OF HONOLULU, HI	FLOOD PROFILES OHIA STREAM (EAST)

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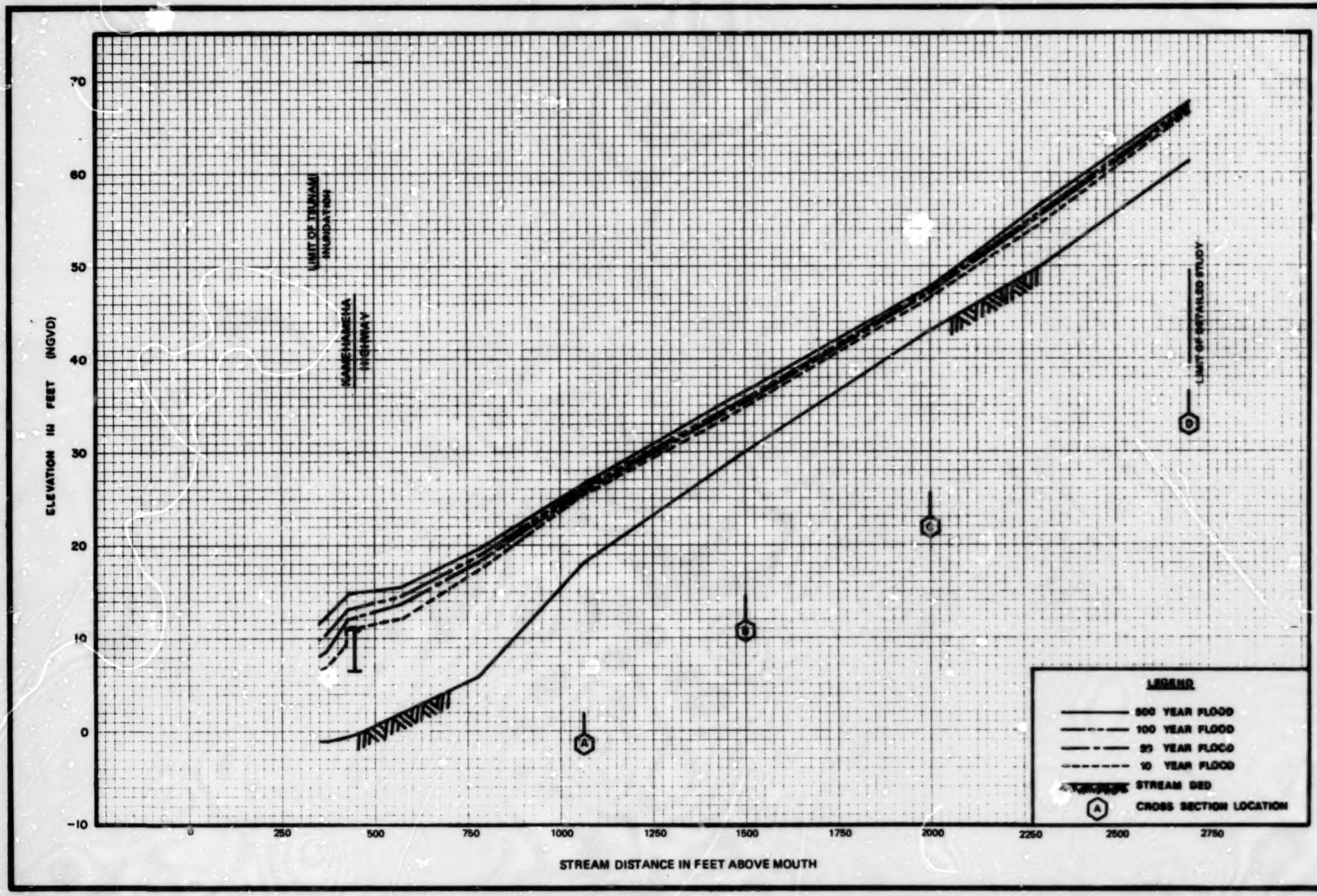

FLOOD PROFILES

KAIPAPAU STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

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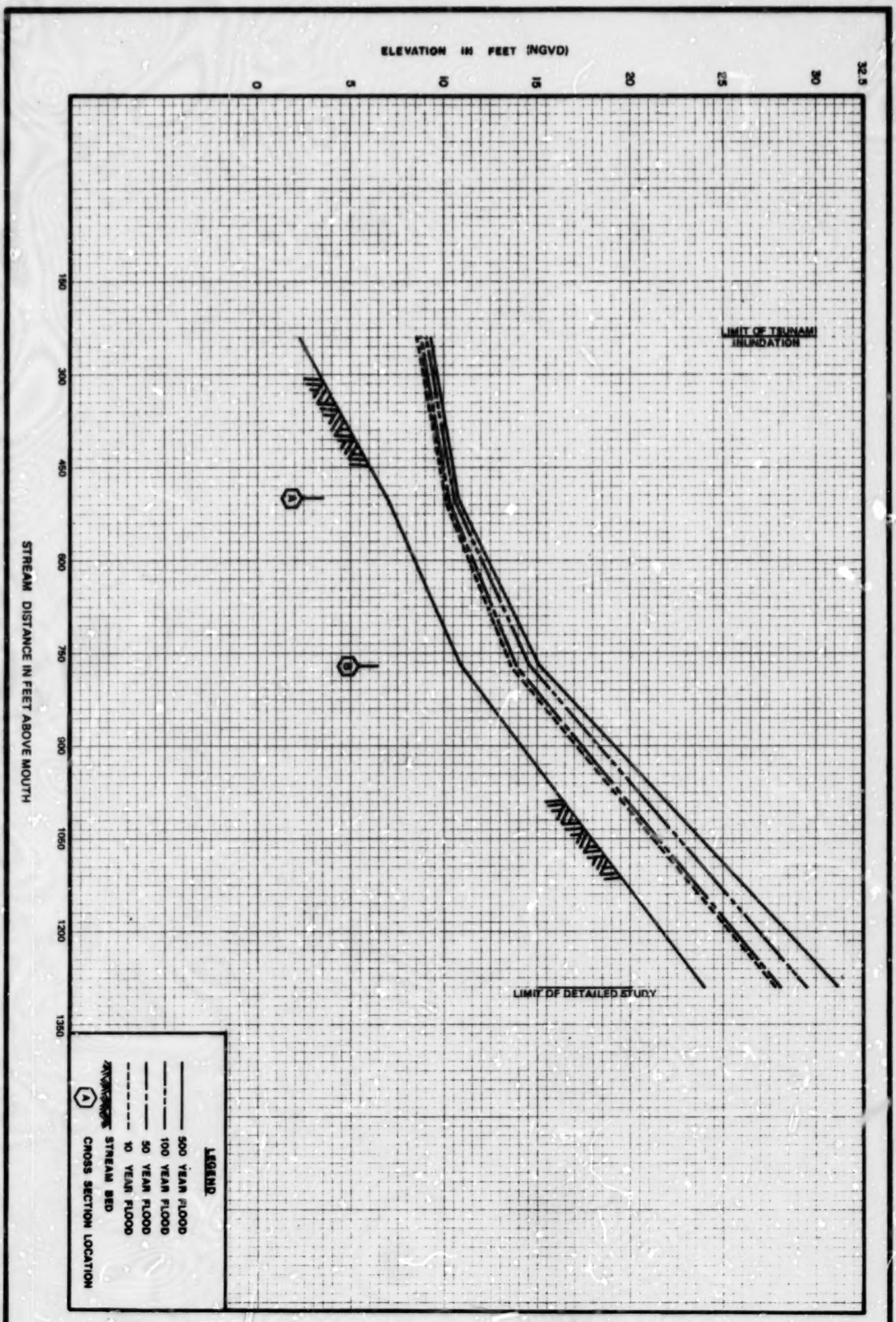

07P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY AND COUNTY OF HONOLULU, HI	FLOOD PROFILES WAIPILOPILO STREAM

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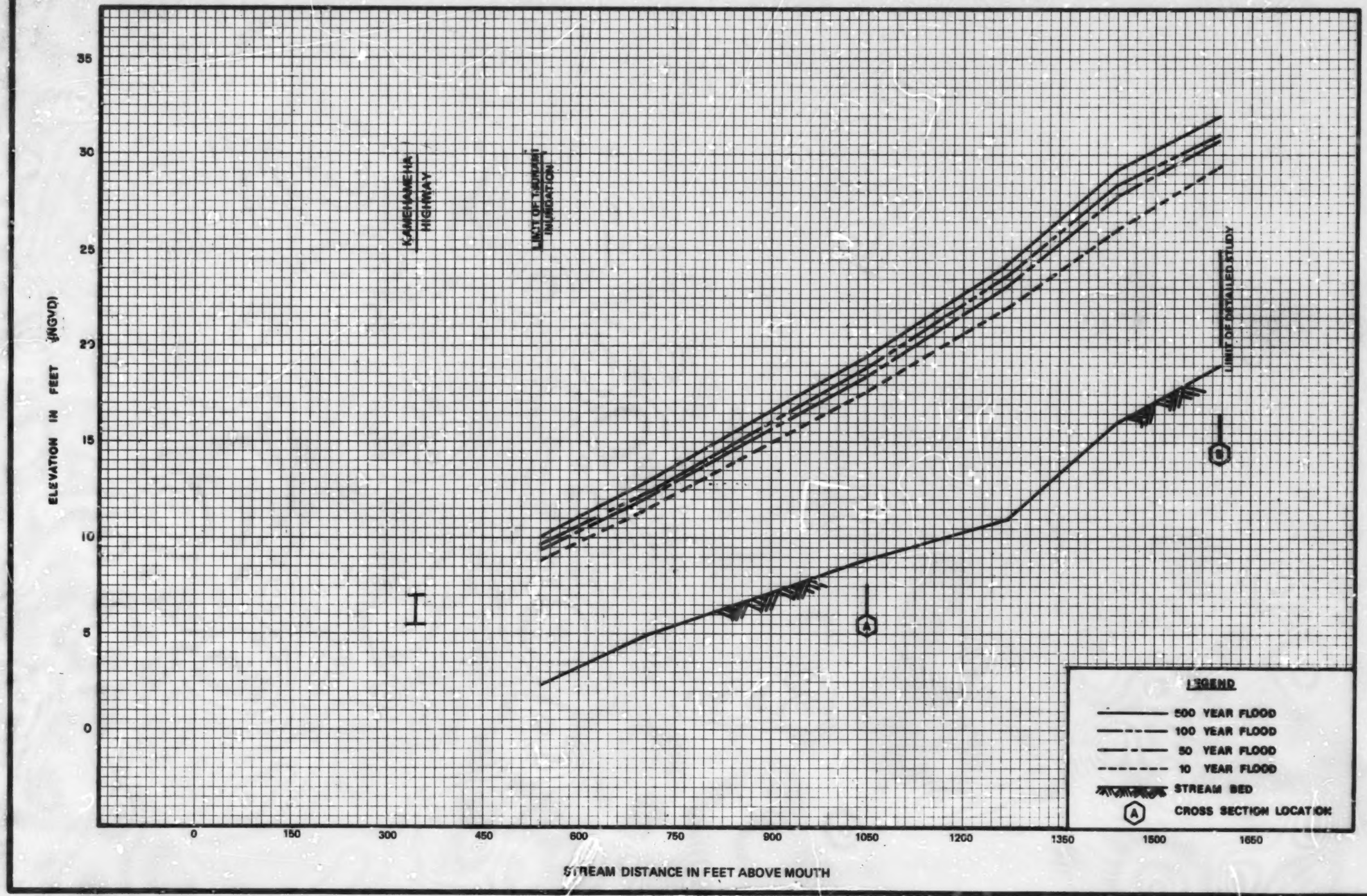

FLOOD PROFILES

HANAHIMOA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

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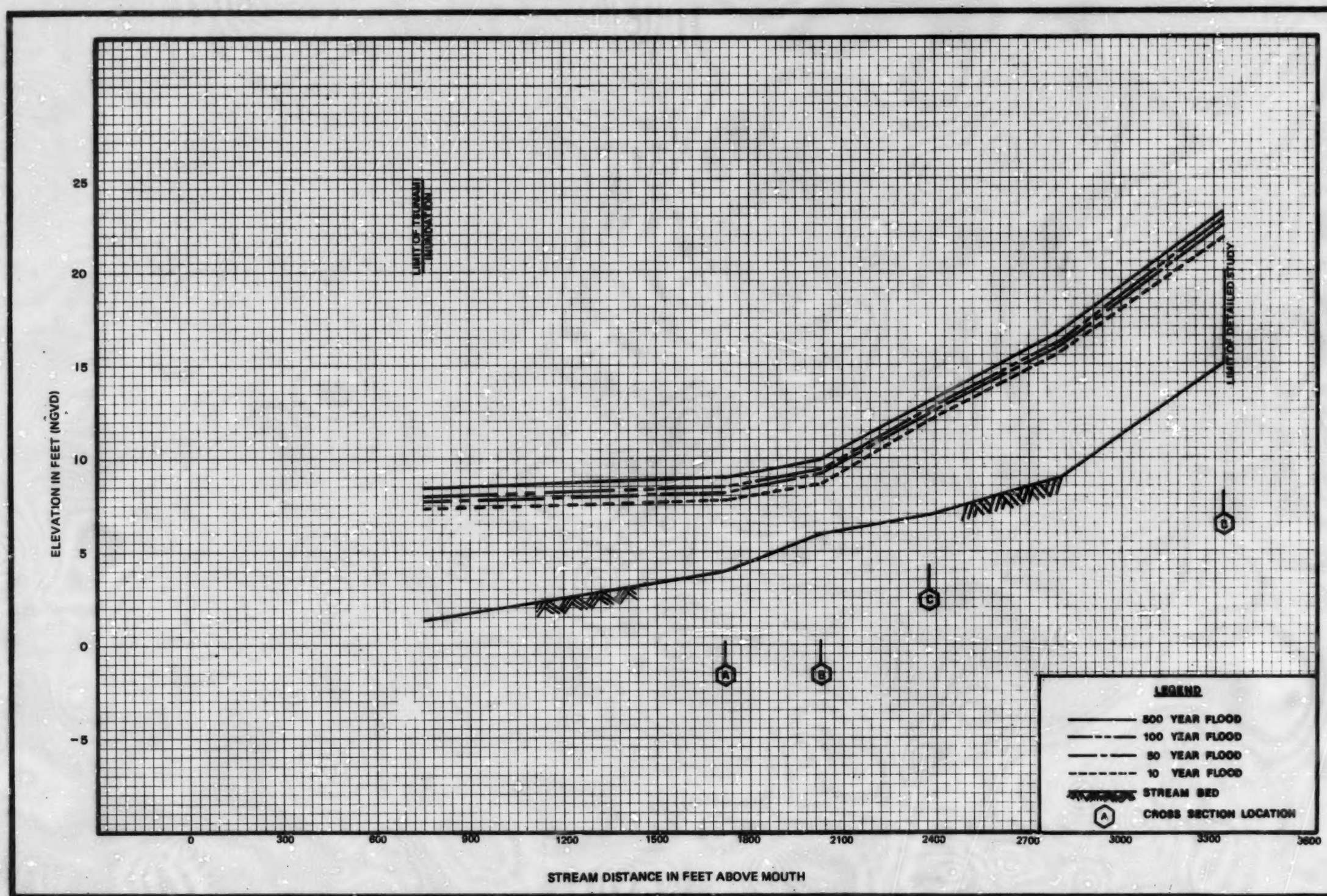

FLOOD PROFILES

KALUANUI STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

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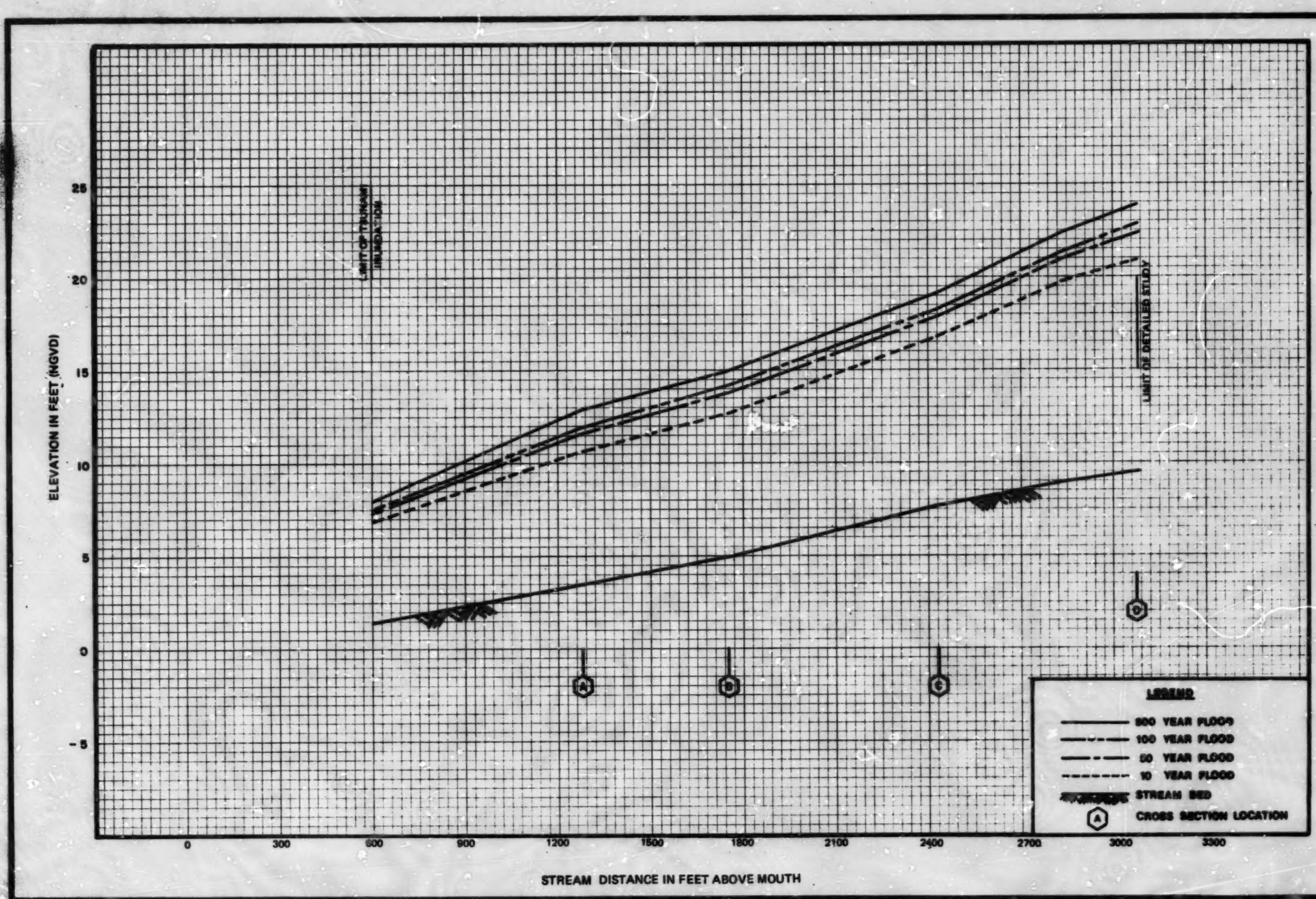

FLOOD PROFILES

PUNALUU STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

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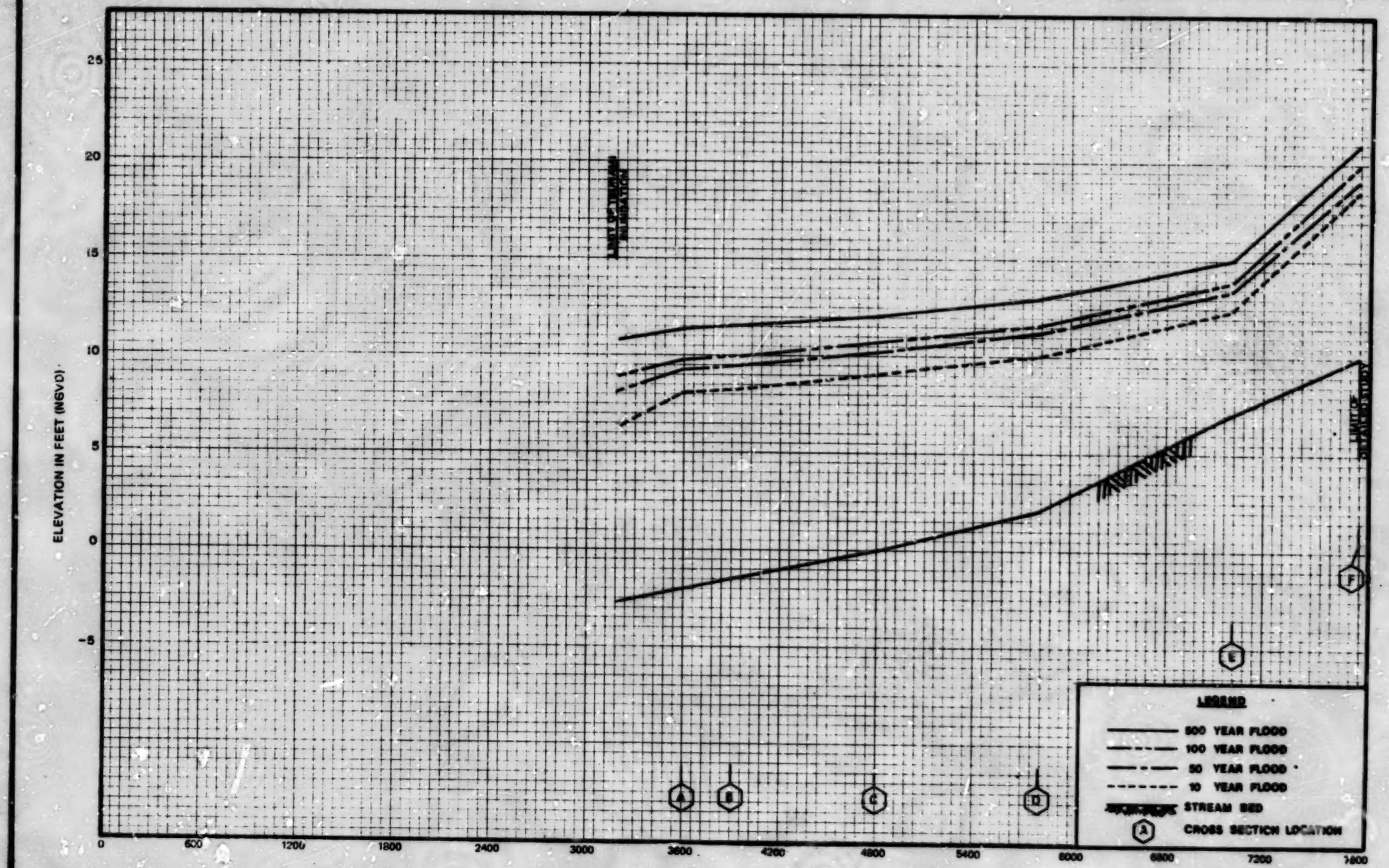

FLOOD PROFILES

KAHANA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

11P

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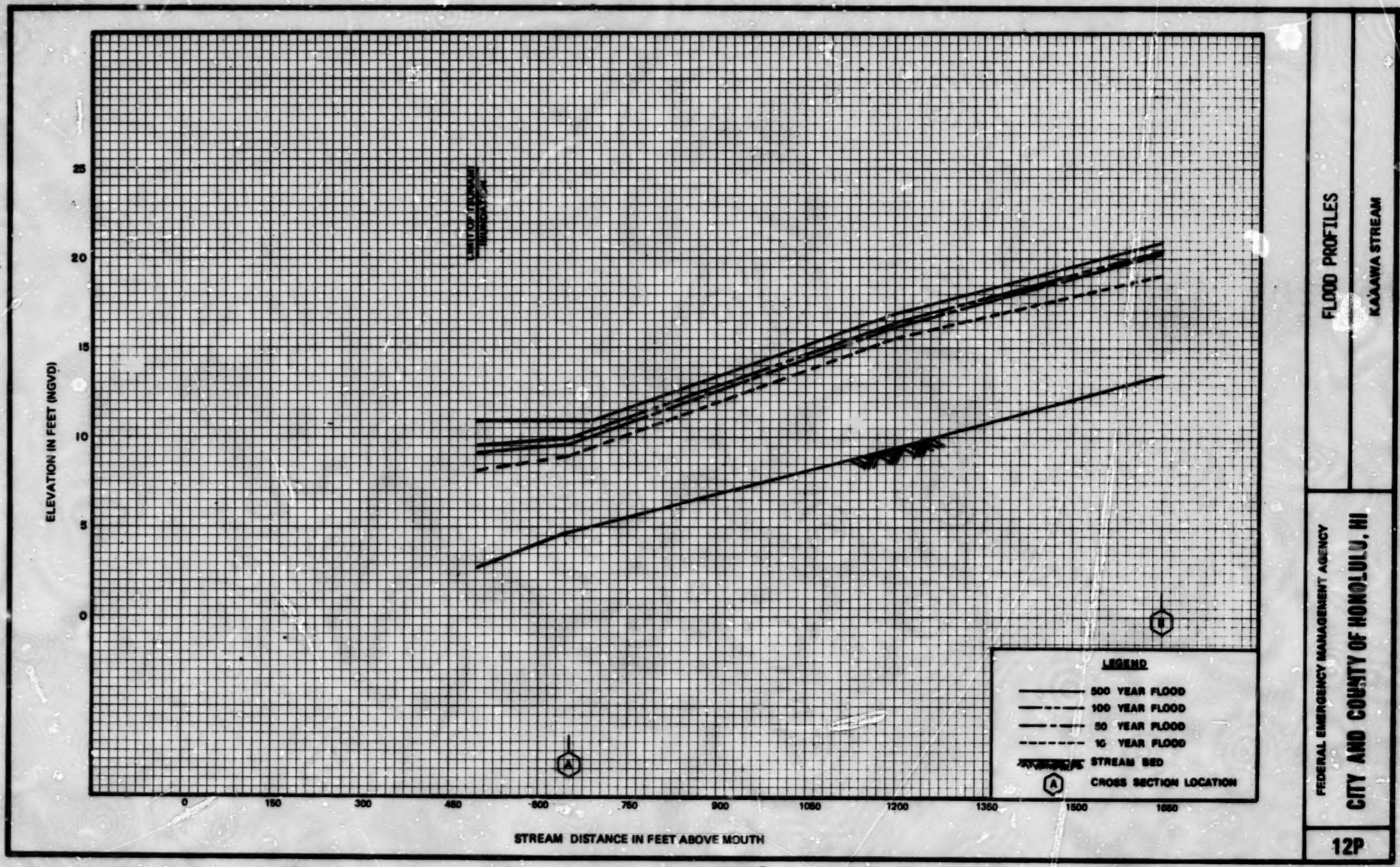

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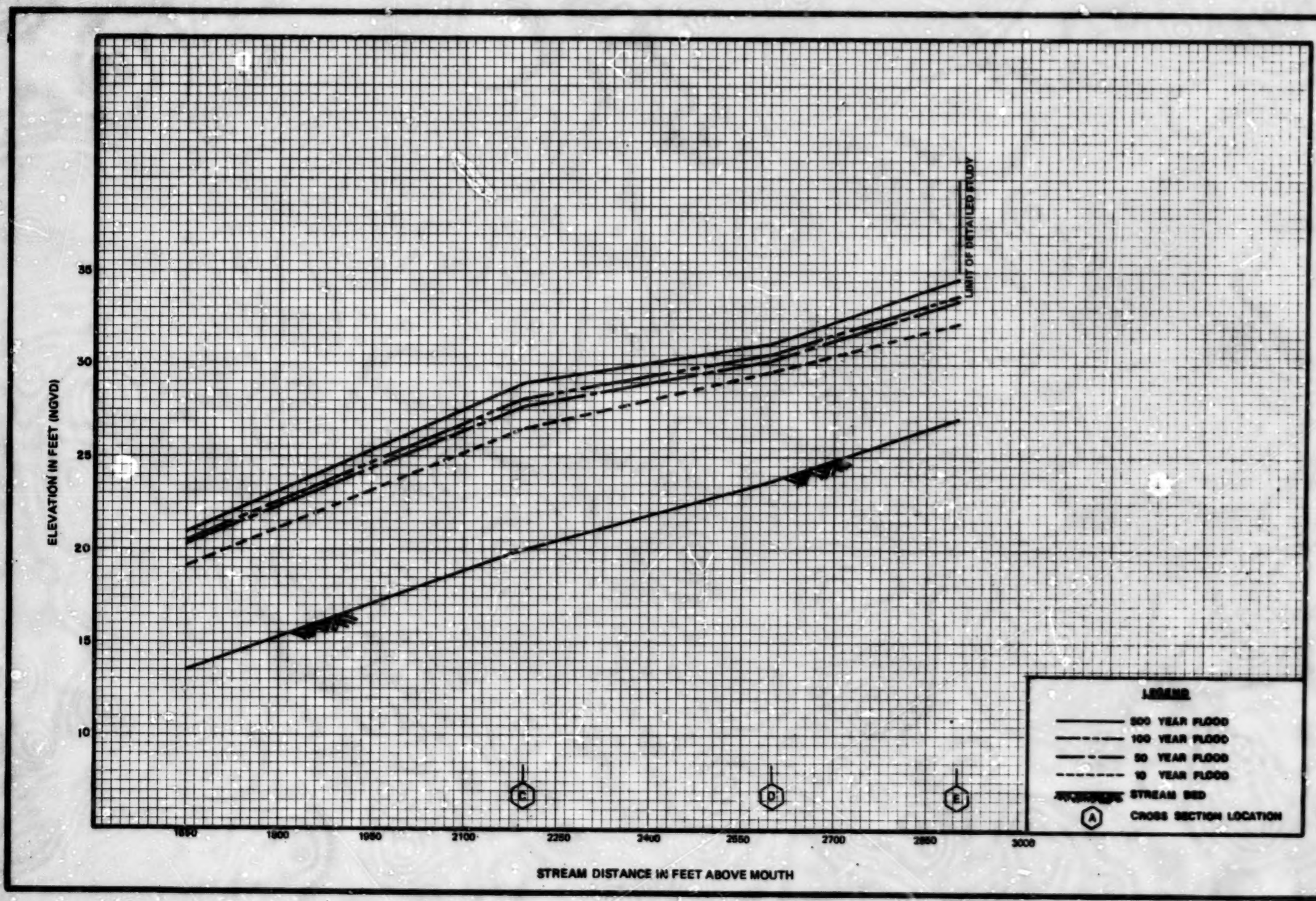

FLOOD PROFILES

KAAAWA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

13P

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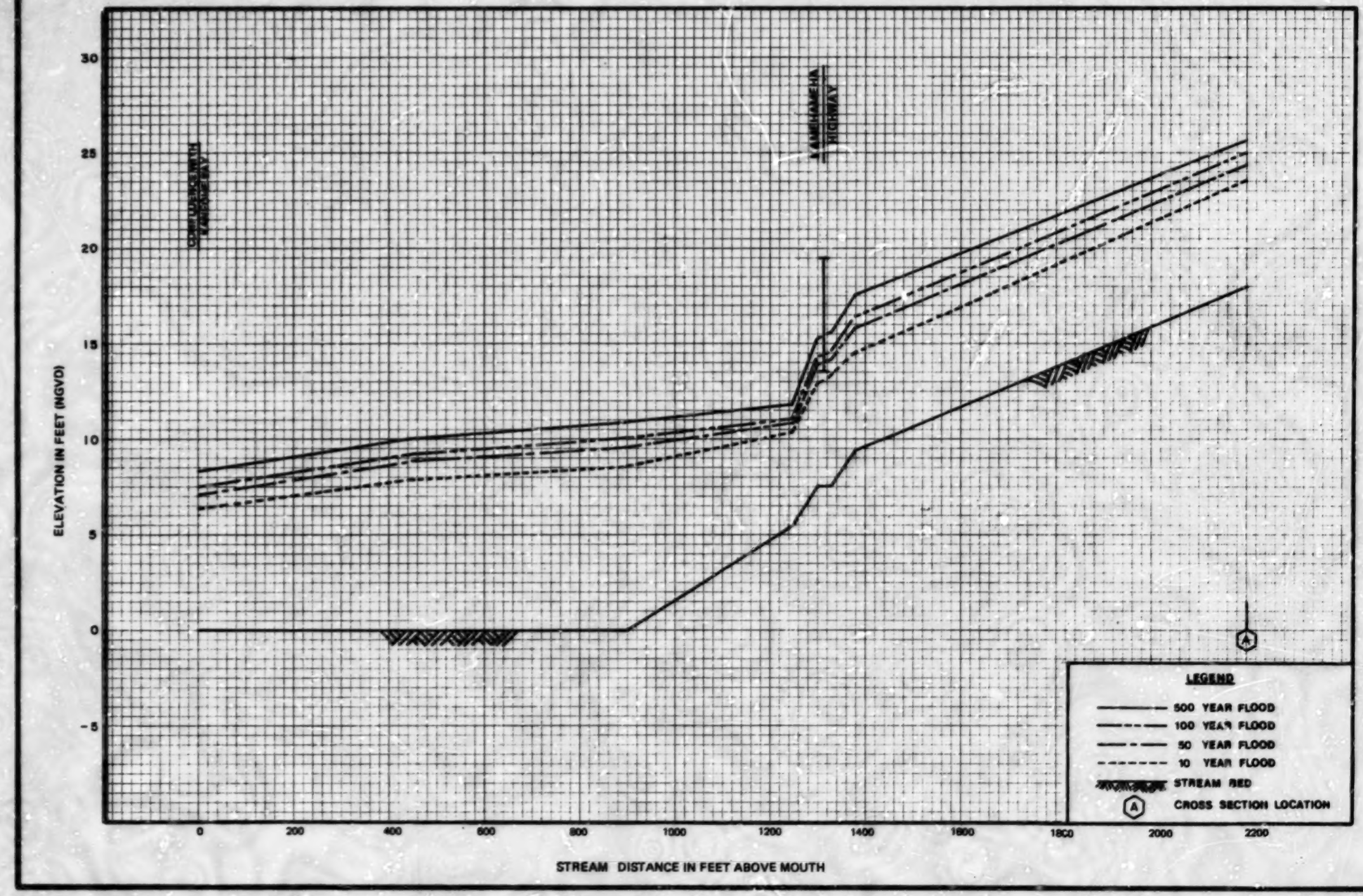

FLOOD PROFILES

WAIKANE STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

14P

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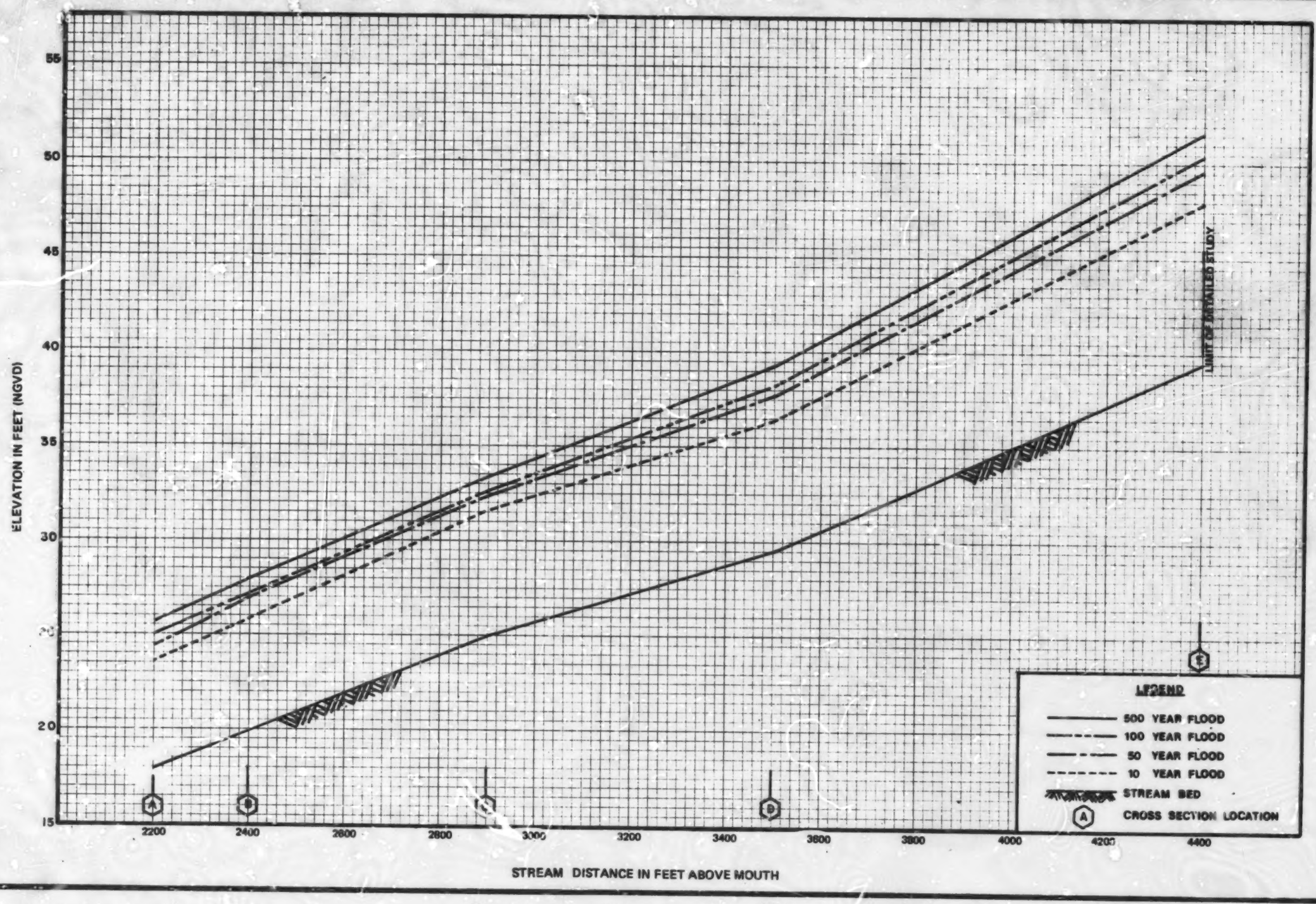

FLOOD PROFILES

WAIKANE STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

15P

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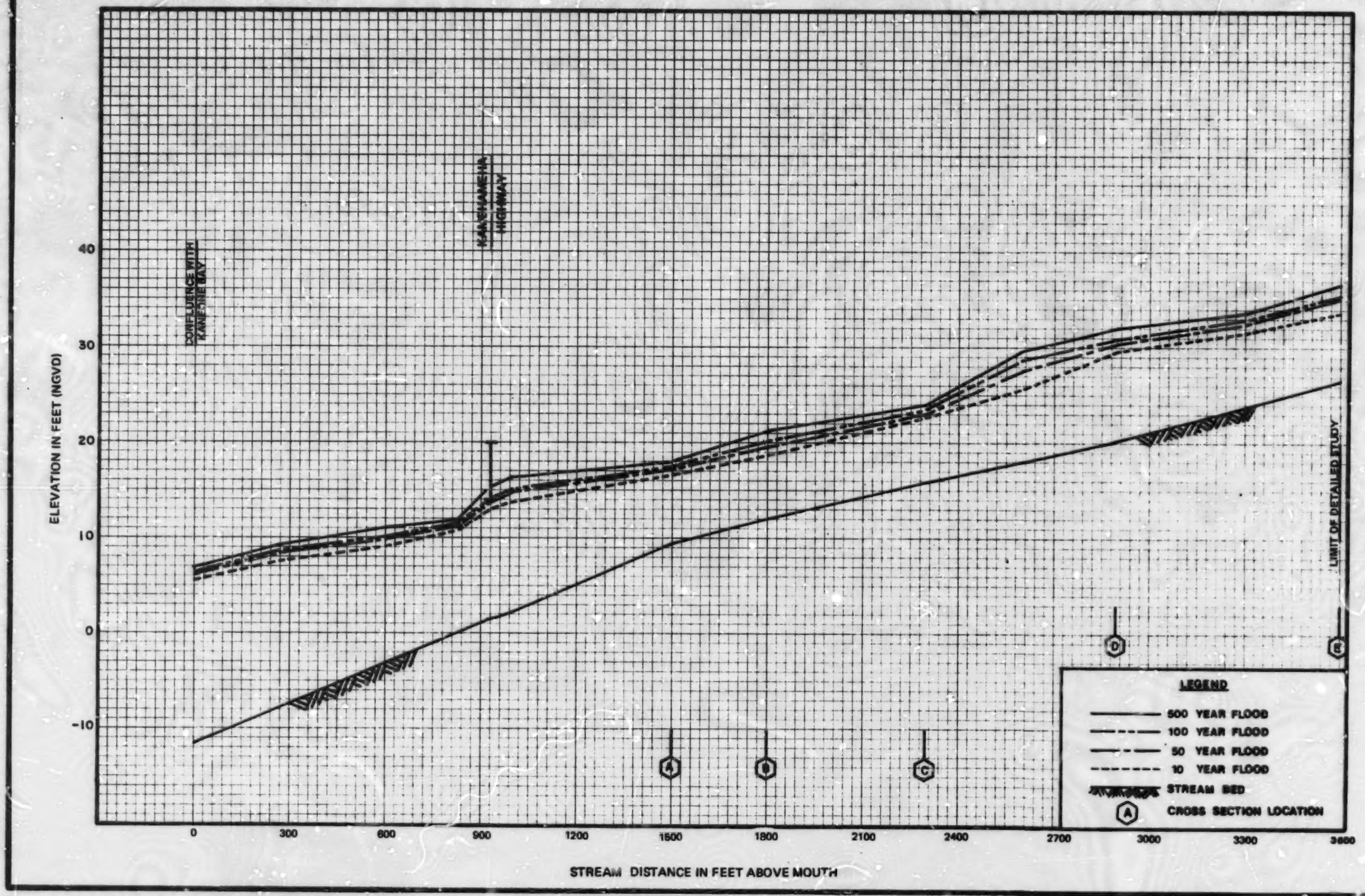

FLOOD PROFILES

WAIAHOLE STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

16P

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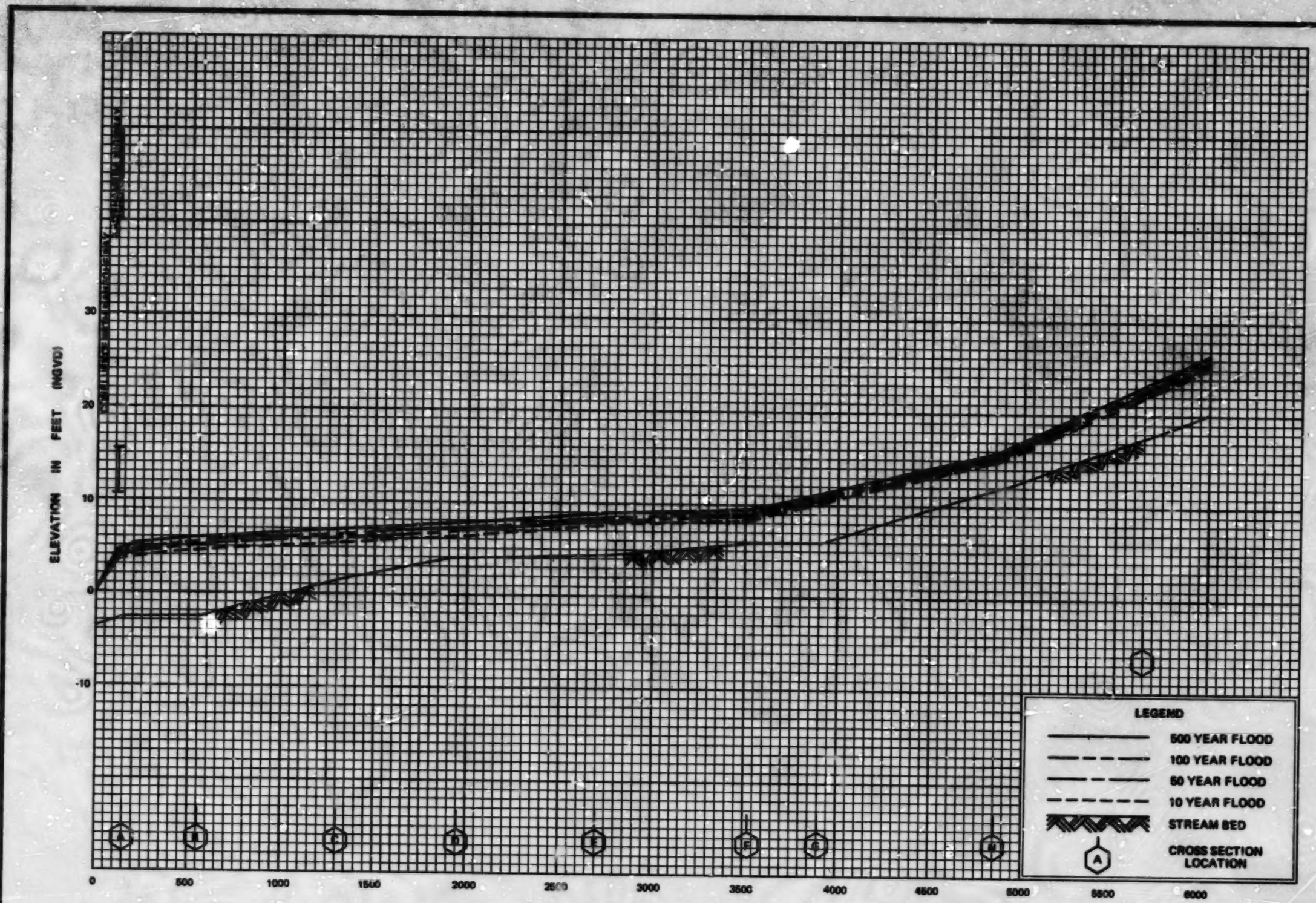

FLOOD PROFILES

HEEIA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

17P

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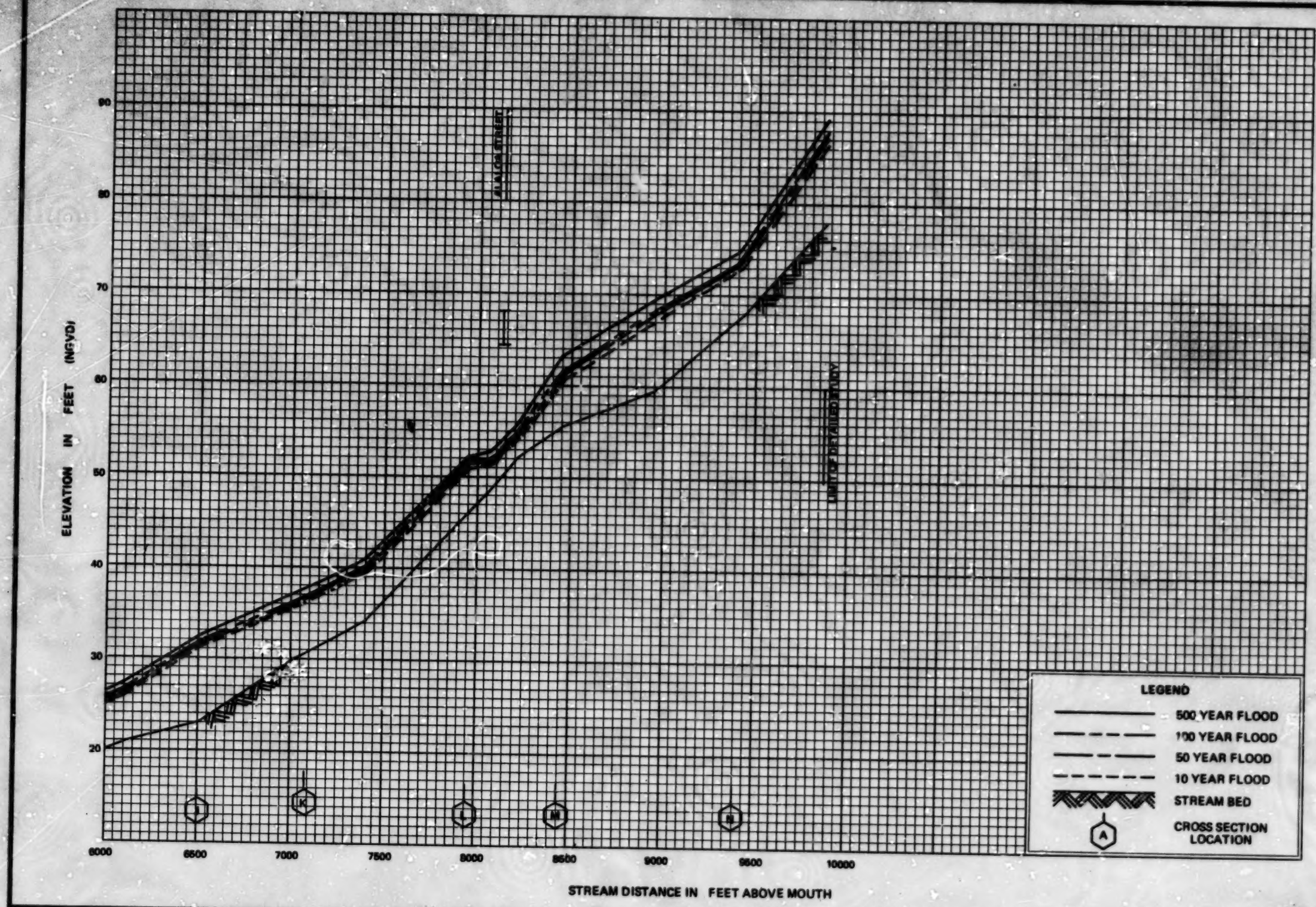

FLOOD PROFILES

HEEIA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

18P

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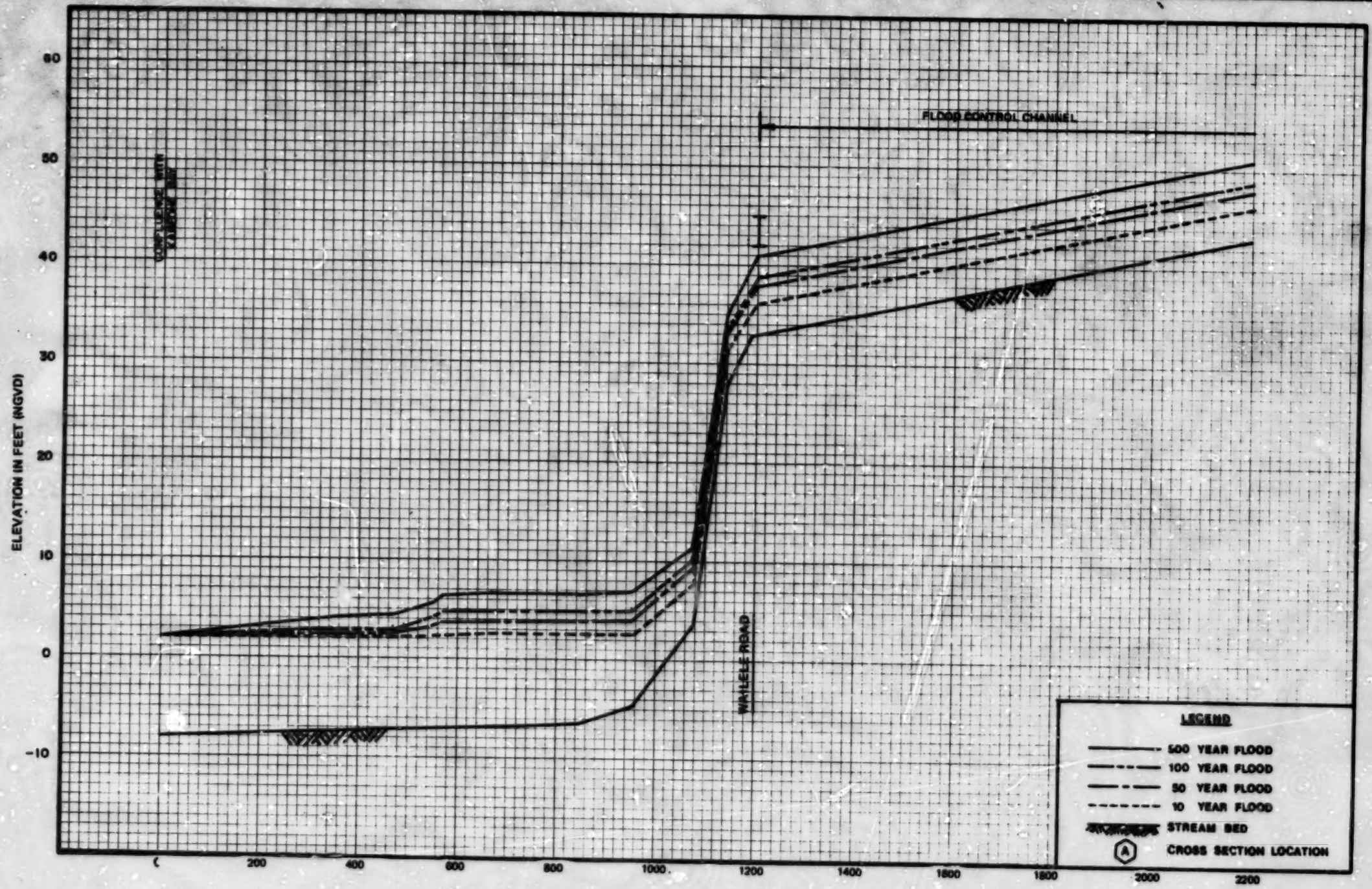

FLOOD PROFILES

KEAHALA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

19P

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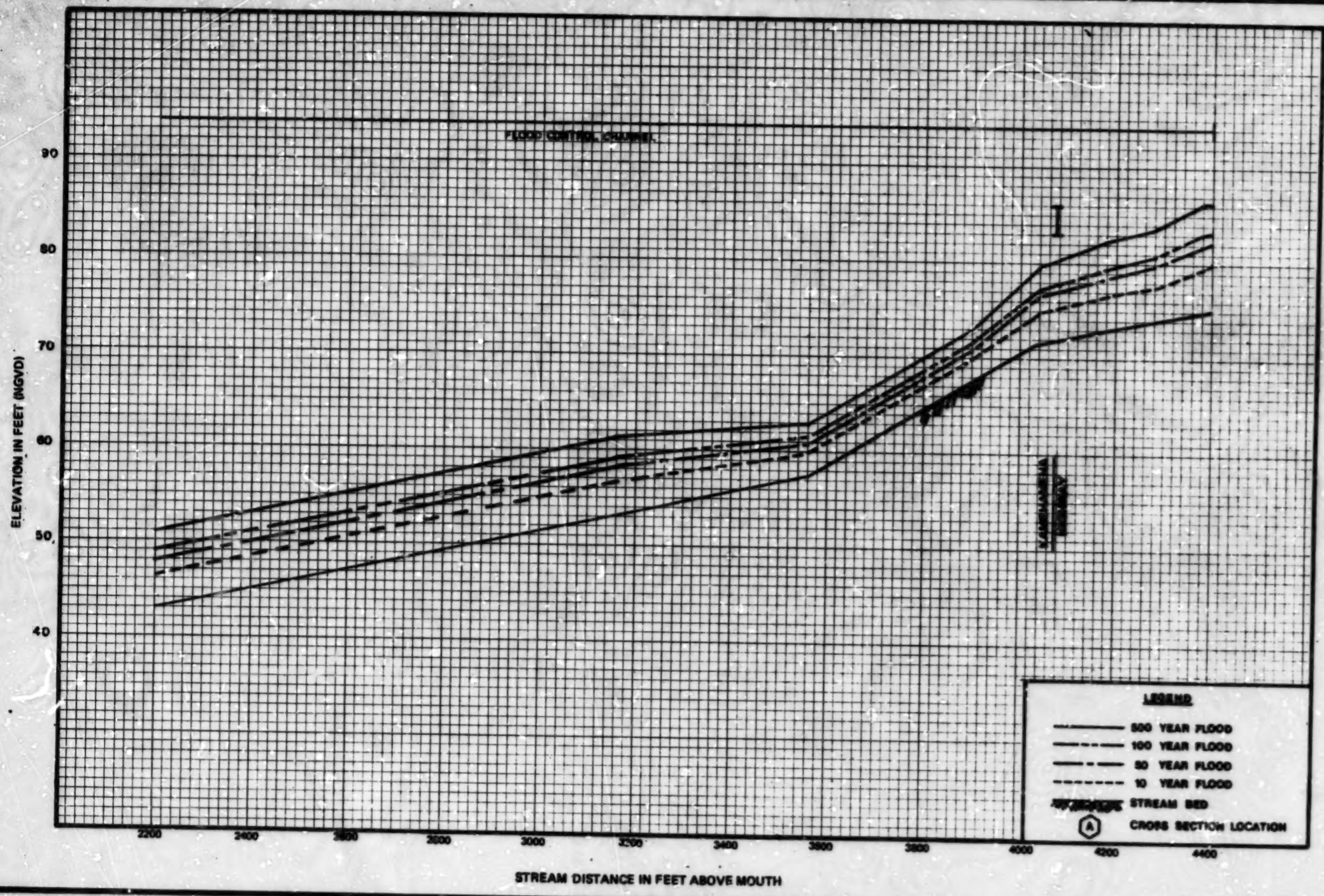

FLOOD PROFILES

KEAAHALA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

20P

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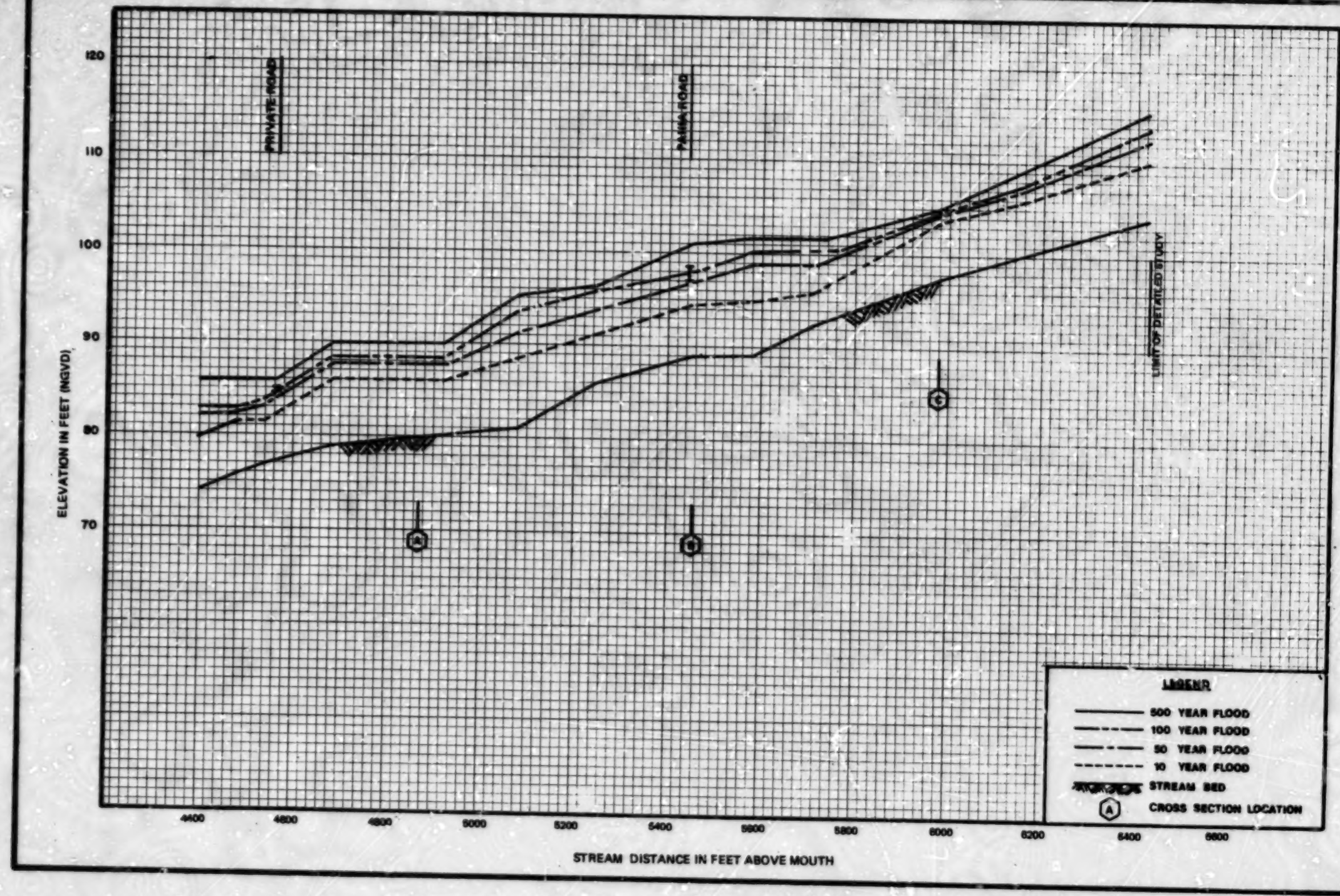

FLOOD PROFILES

KEAAHALA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

21P

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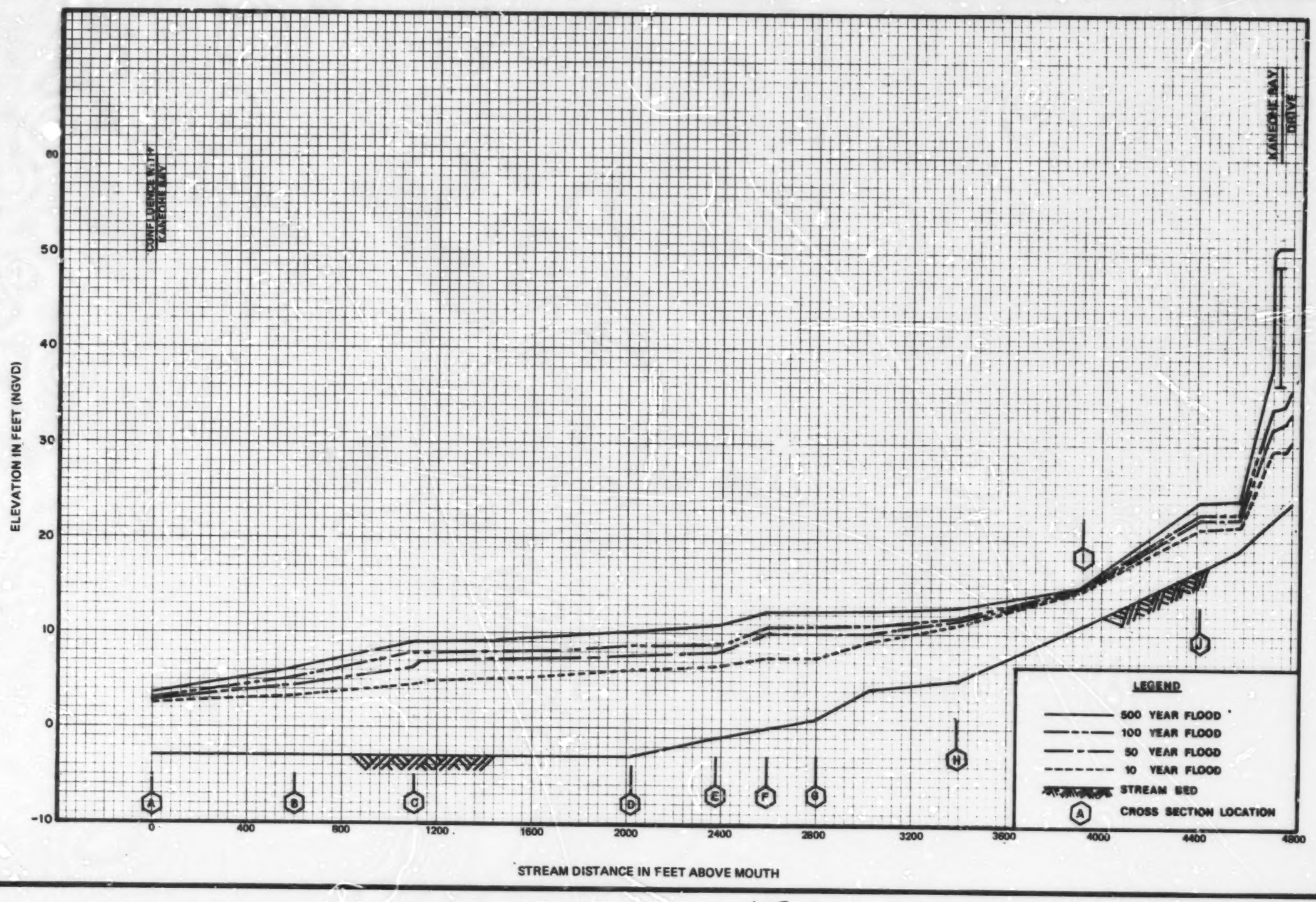

FLOOD PROFILES

KAWA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

22P

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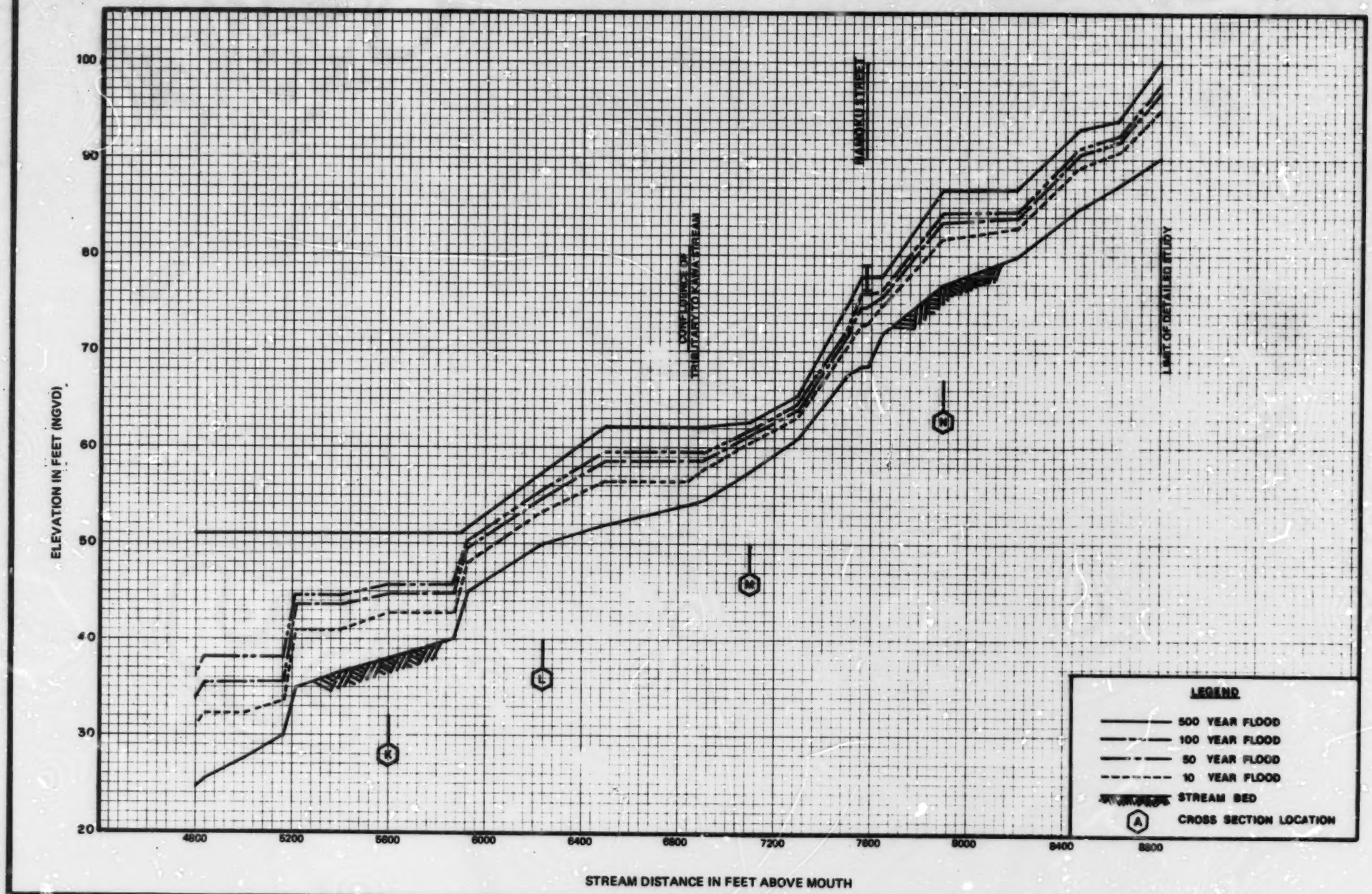

FLOOD PROFILES

KAWA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

23P

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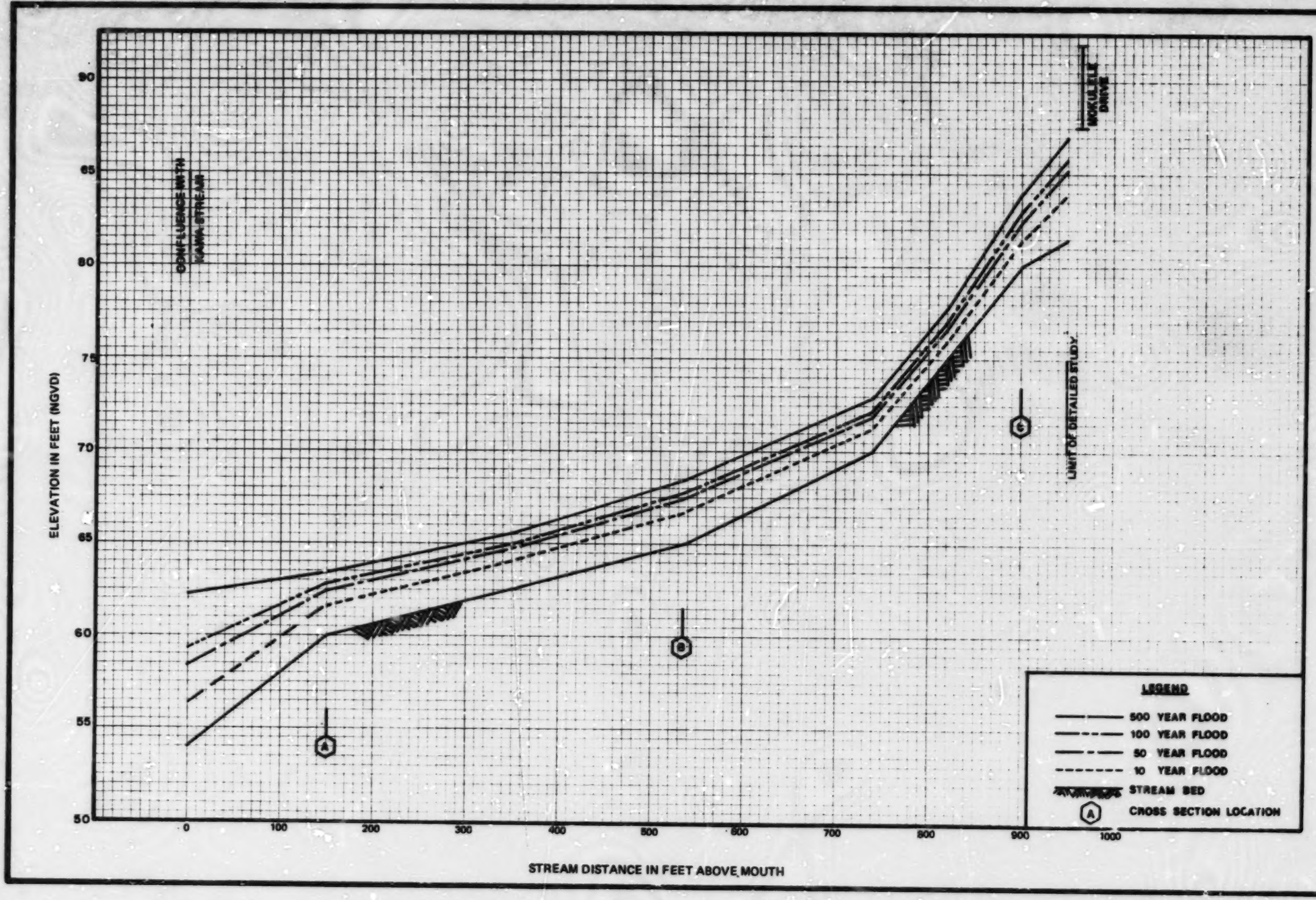

FLOOD PROFILES

TRIBUTARY TO KAWA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

24P

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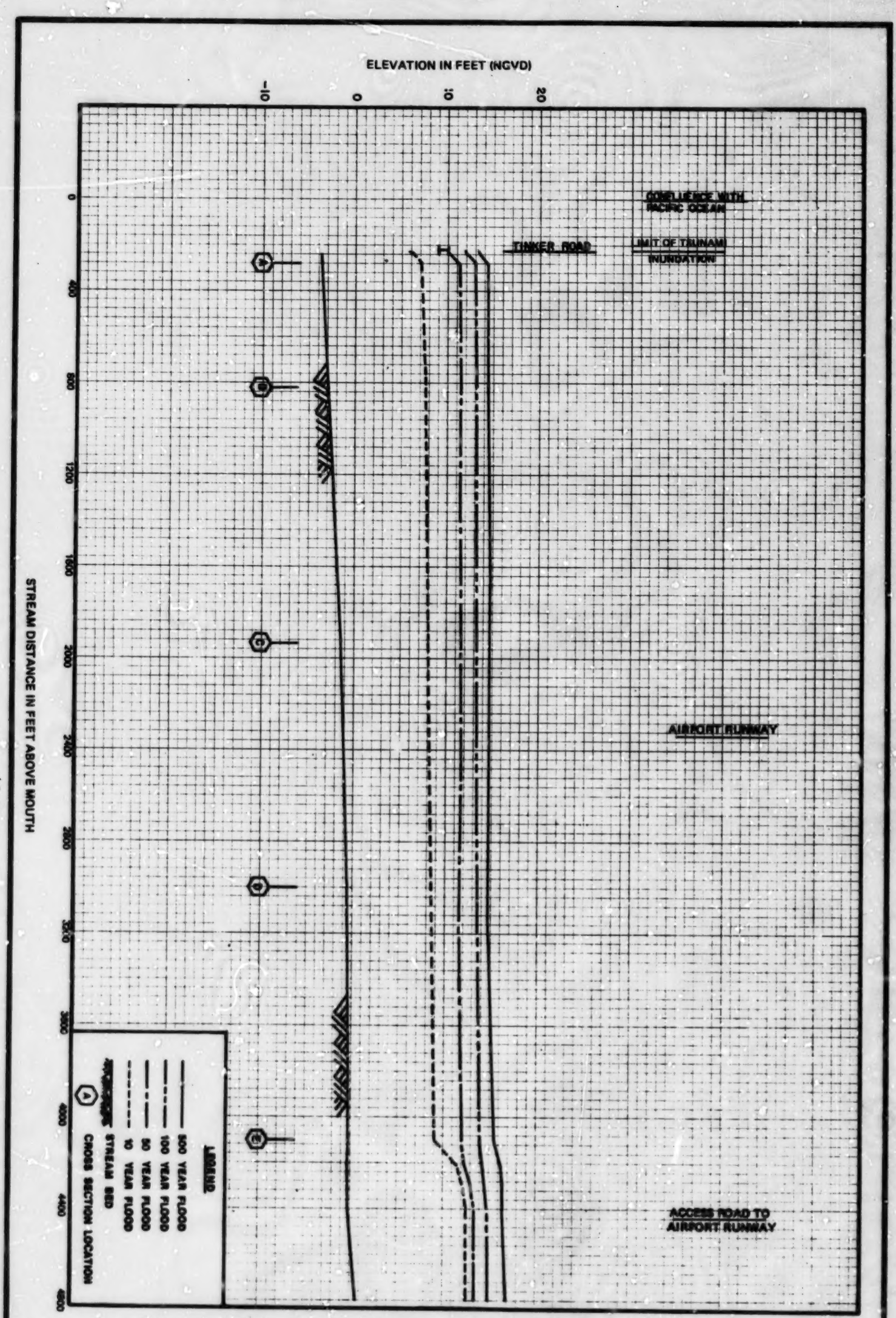

25P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY AND COUNTY OF HONOLULU, HI	FLOOD PROFILES WAIMANALO STREAM

130

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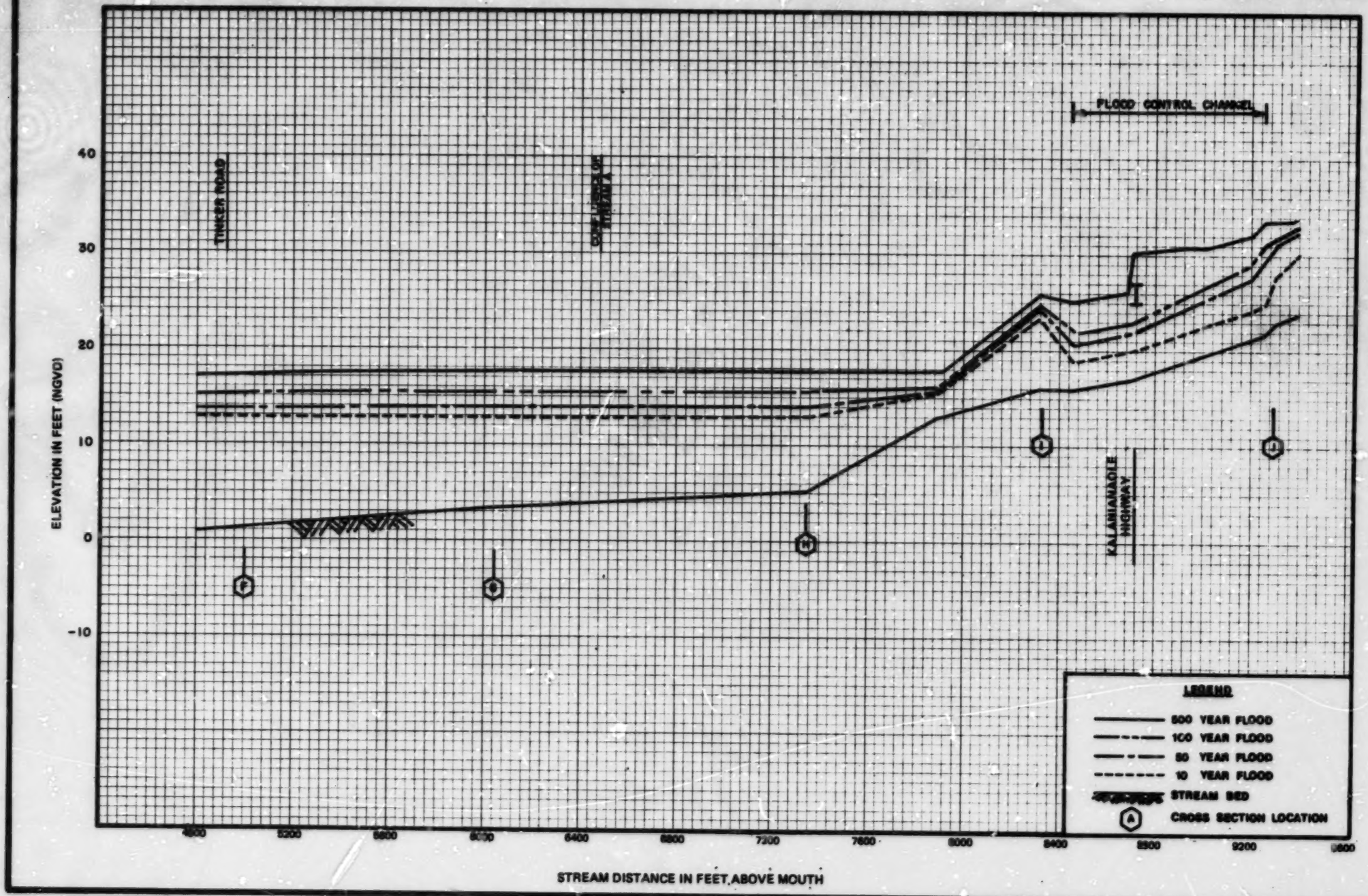

FLOOD PROFILES

WAIMANALO STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

26P

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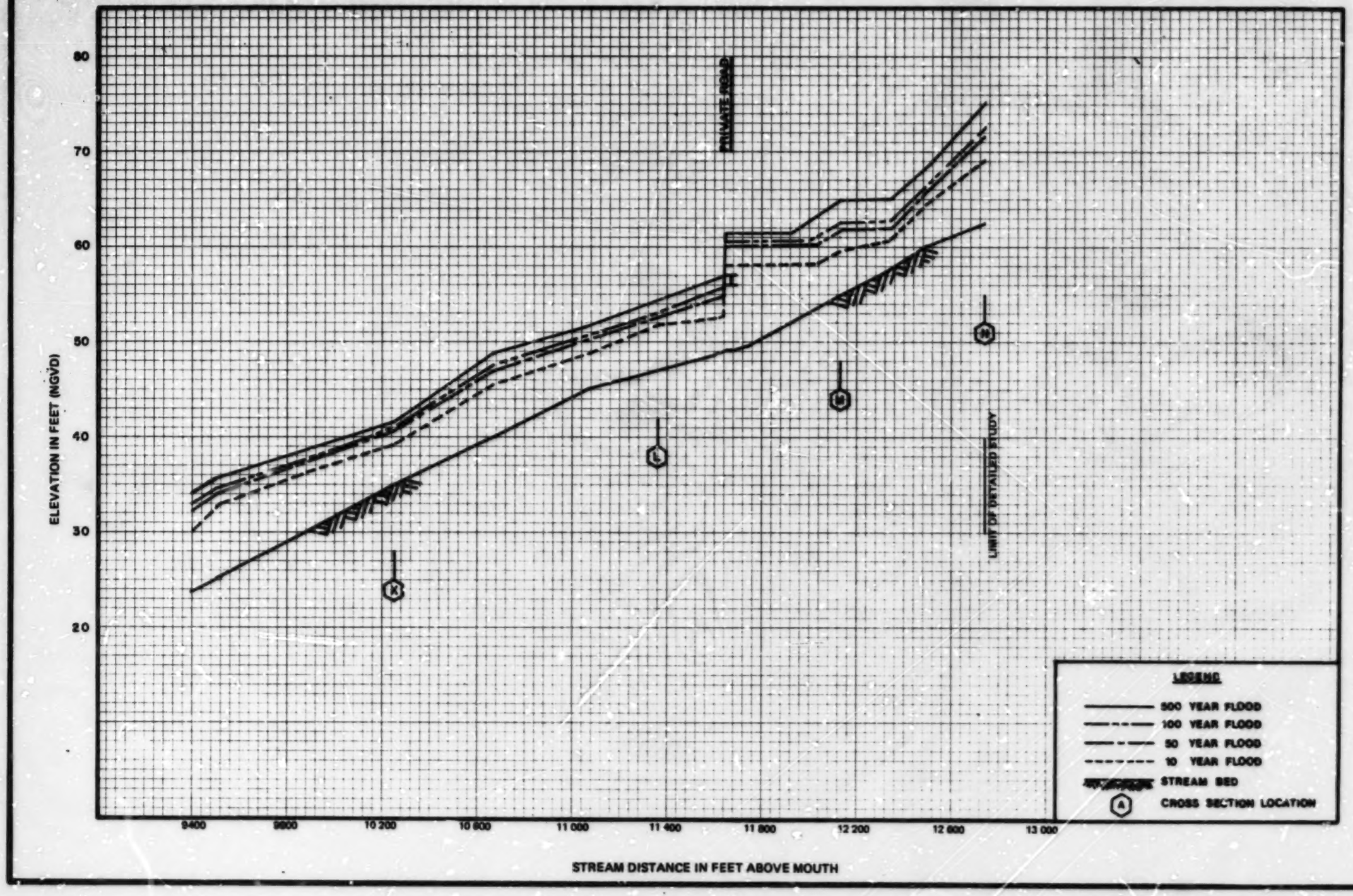

FLOOD PROFILES

WAIMANALO STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

27P

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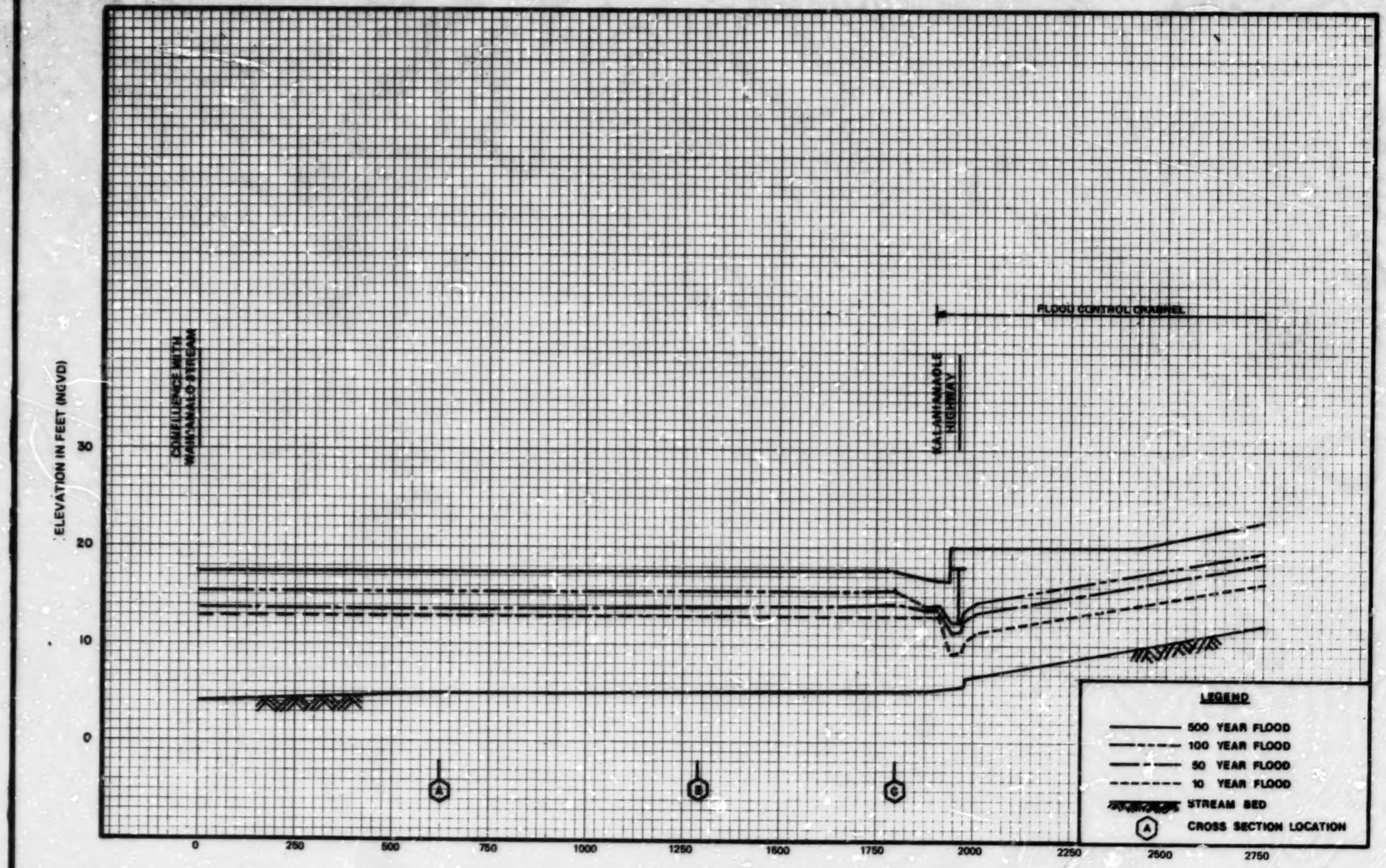

FLOOD PROFILES

WAIMANALO STREAM: STREAM A

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

28P

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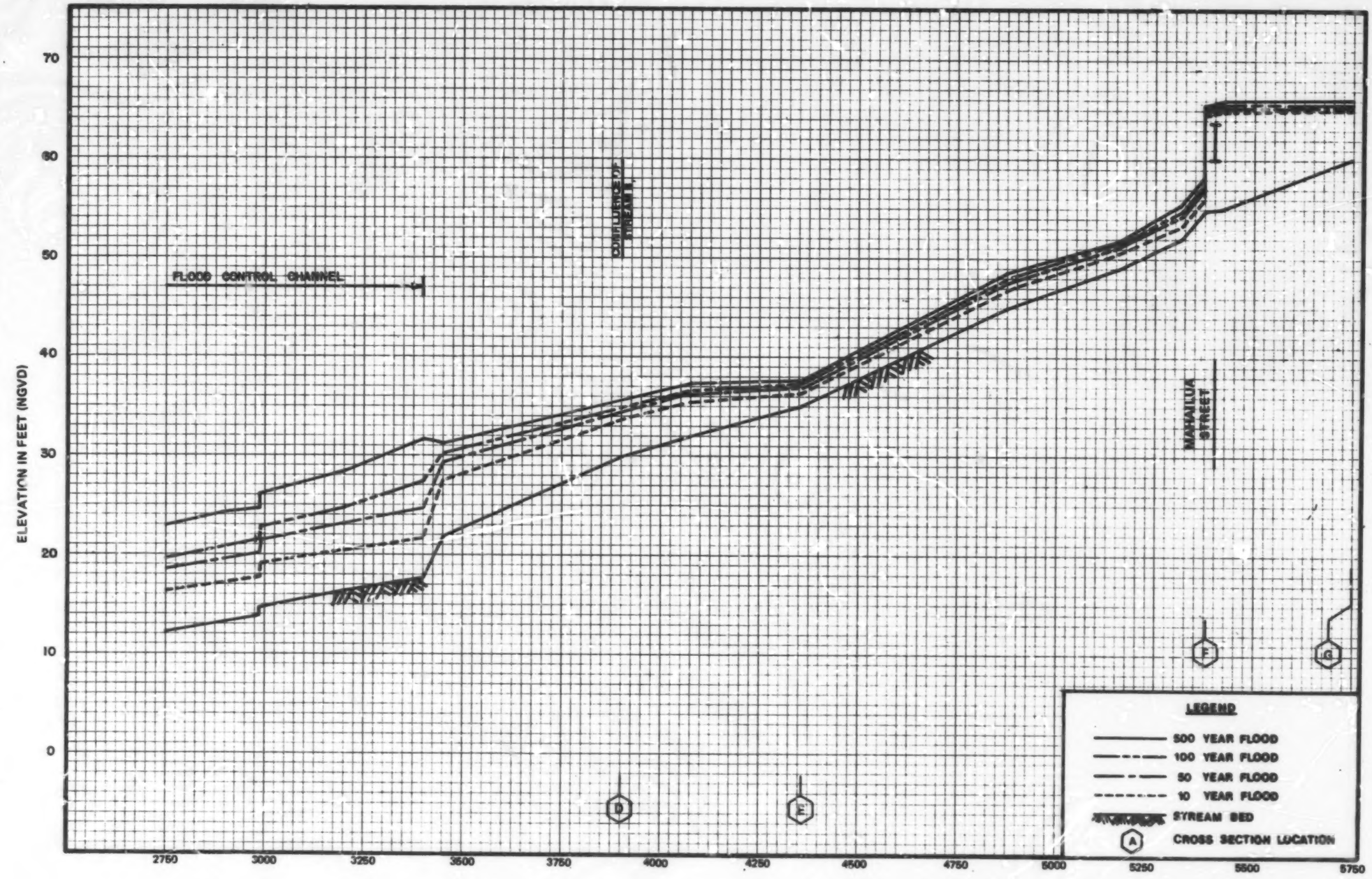

FLOOD PROFILES

WAIMANALO STREAM: STREAM A

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

29P

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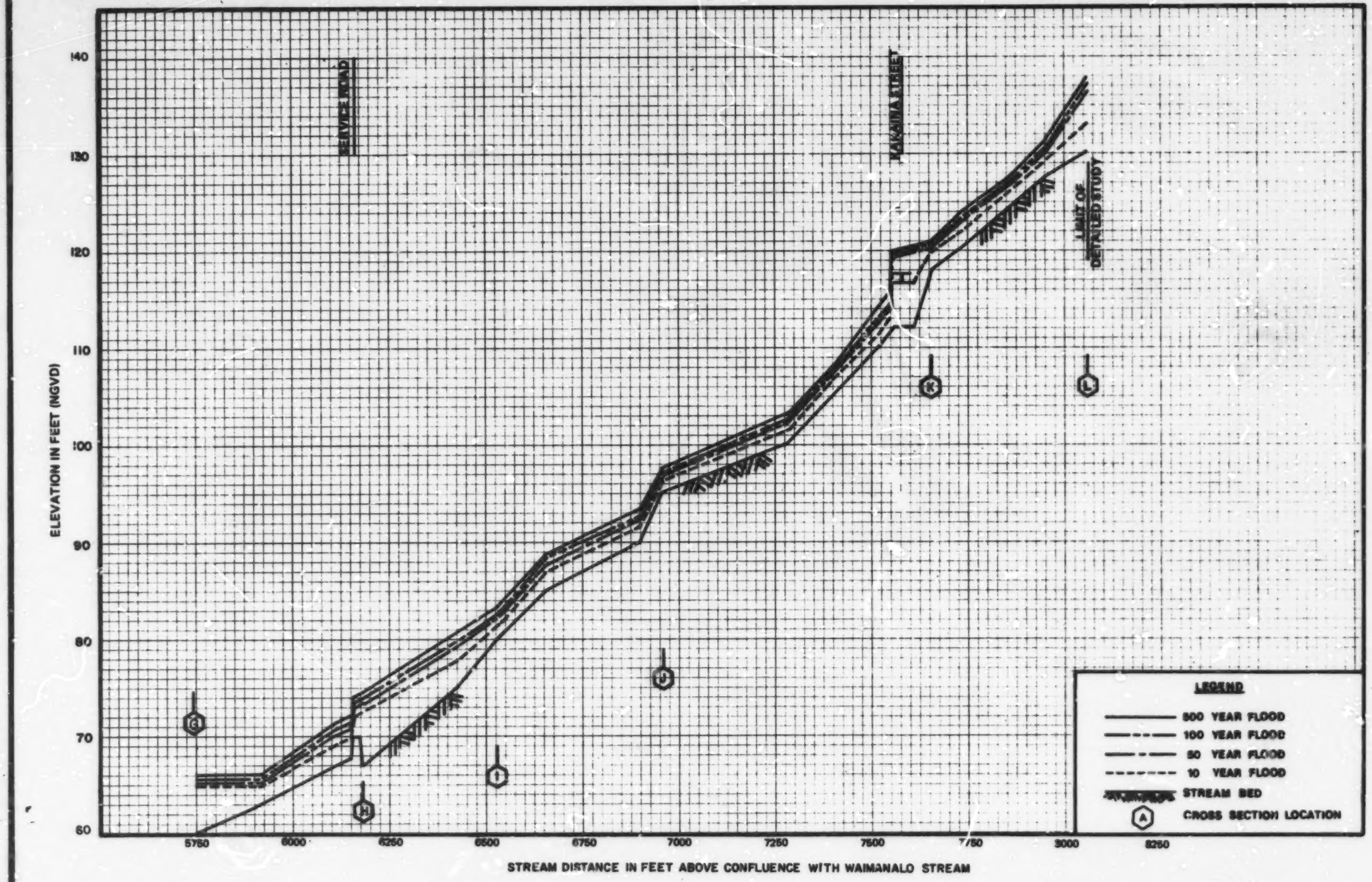

FLOOD PROFILES

WAIMANALO STREAM: STREAM A

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

30P

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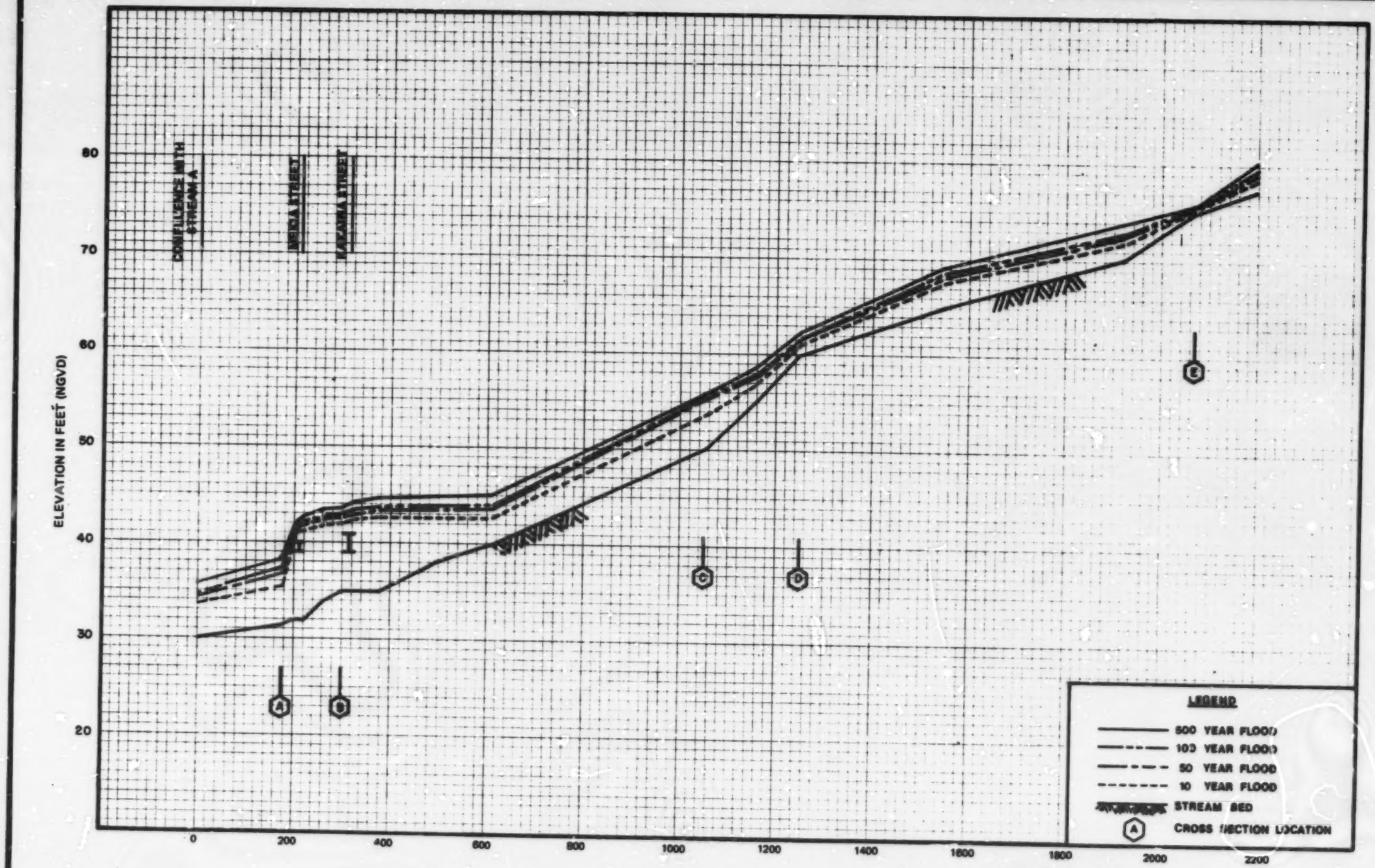

FLOOD PROFILES

WAIMANALO STREAM: STREAM B

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

31P

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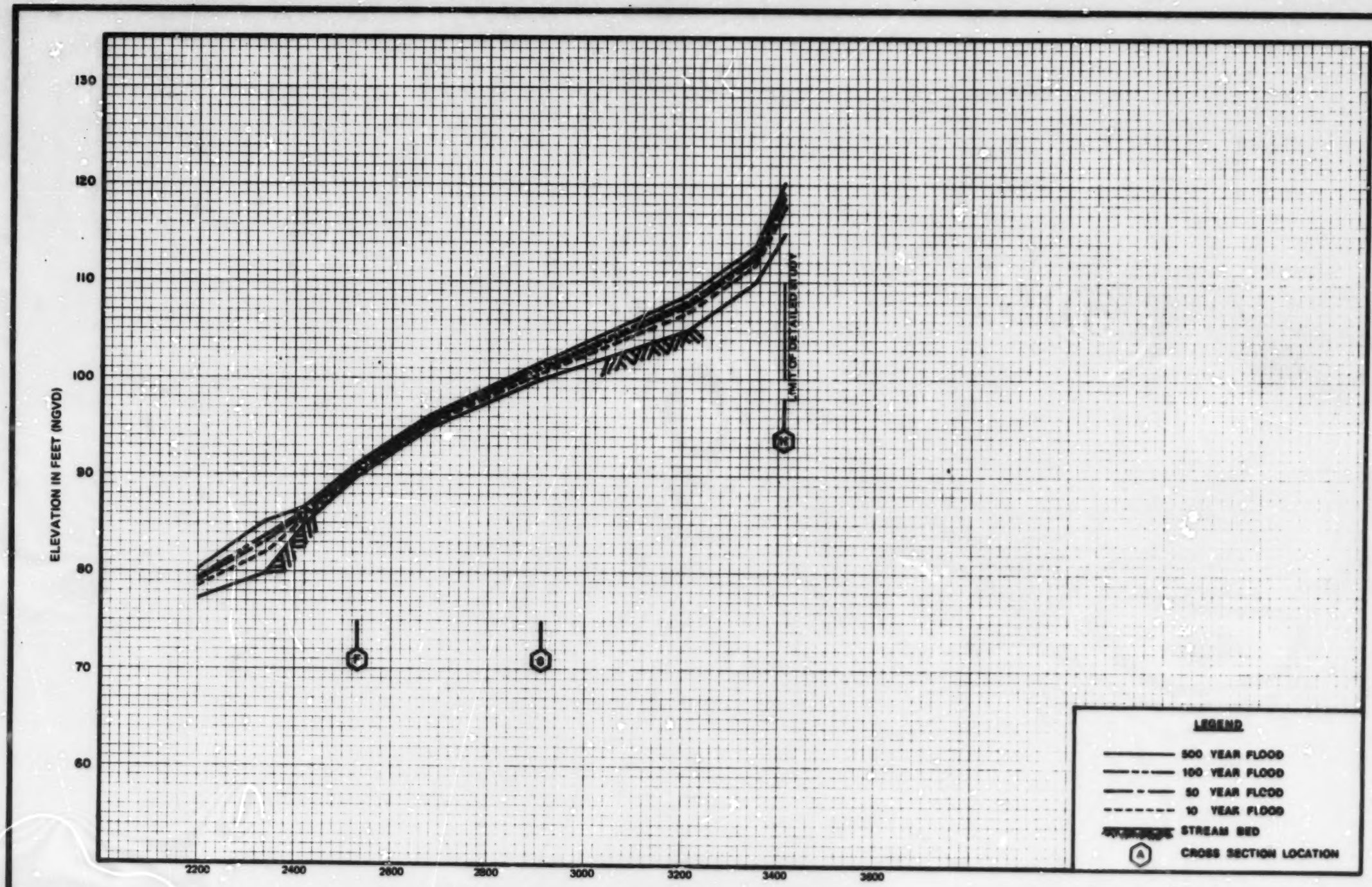

FLOOD PROFILES

WAIMANALO STREAM: STREAM B

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

32P

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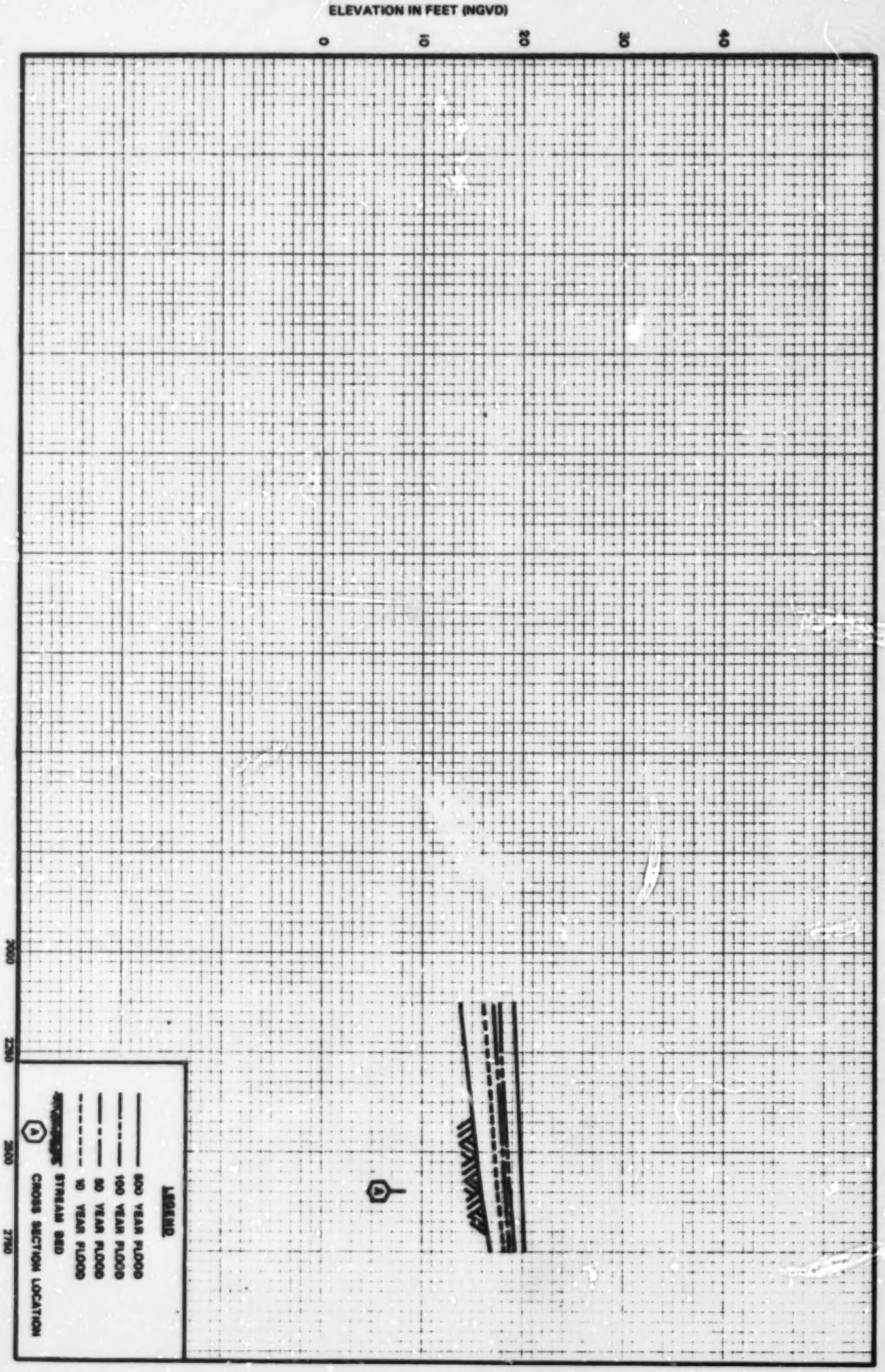

33P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY AND COUNTY OF HONOLULU, HI	FLOOD PROFILES WAIMANALO STREAM: STREAM C

158

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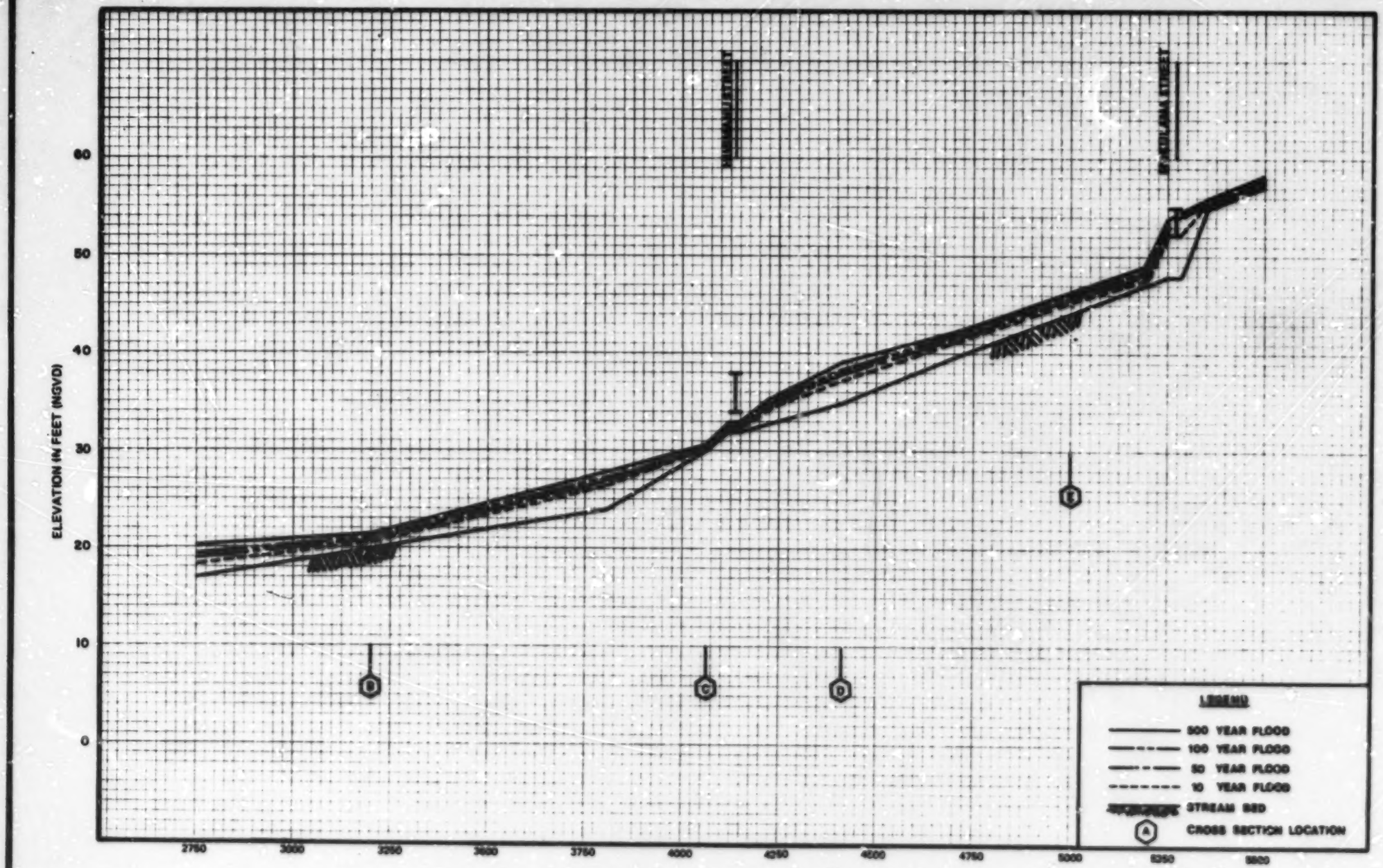

FLOOD PROFILES

WAIMANALO STREAM: STREAM C

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

34P

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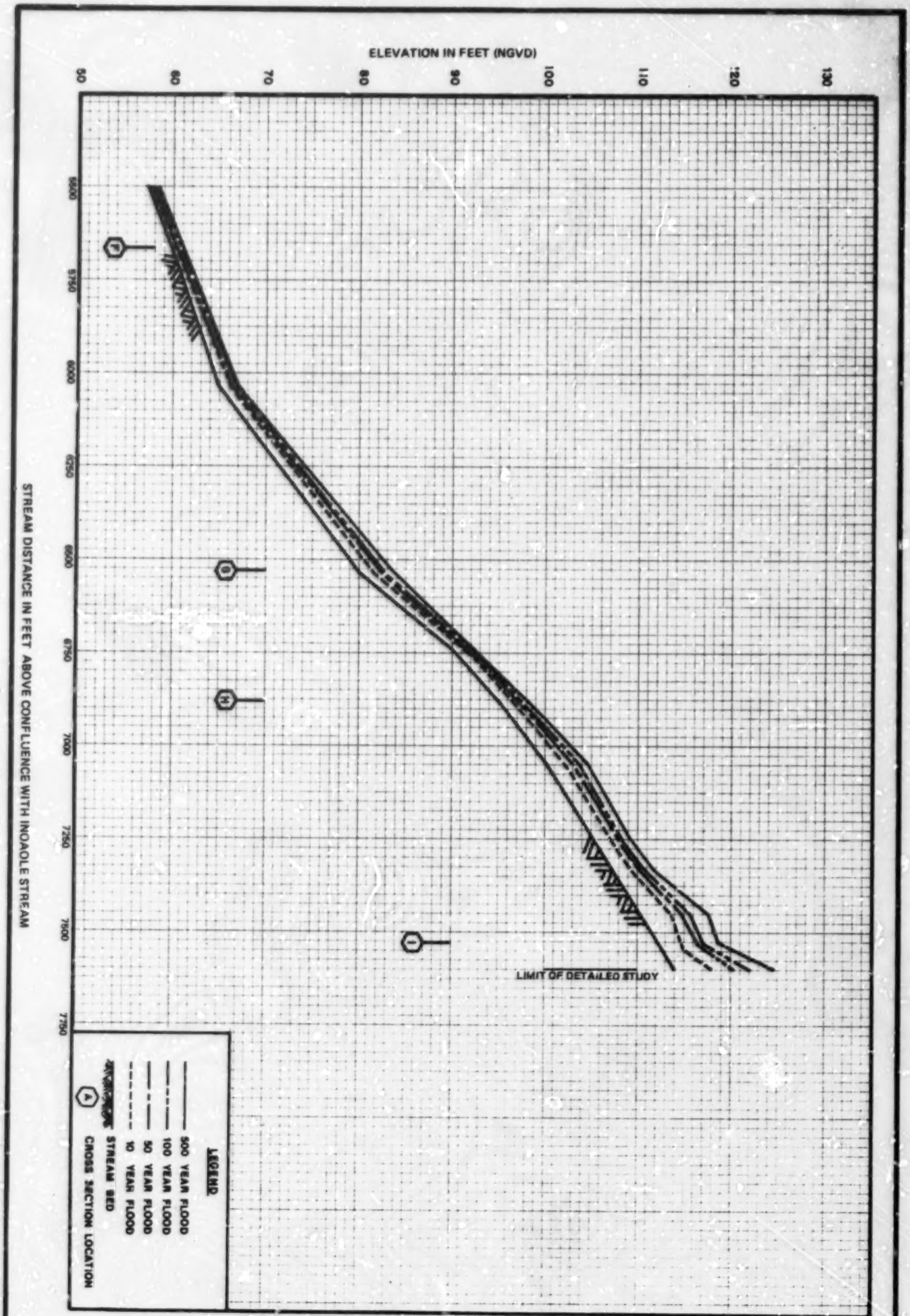

359

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

FLOOD PROFILES

WAIMANALO STREAM: STREAM C

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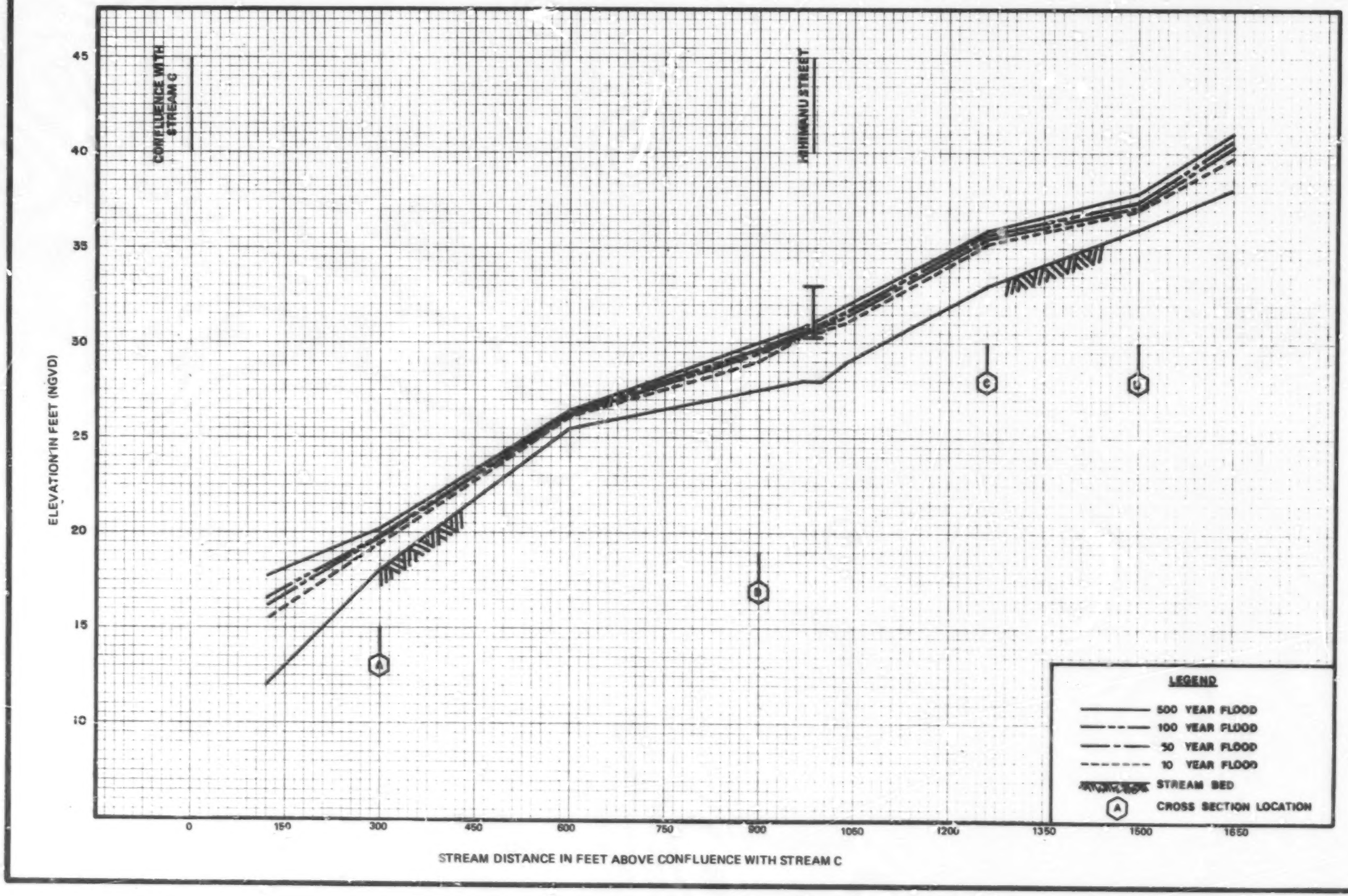

FLOOD PROFILES

WAIMANALO STREAM: STREAM D

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

36P

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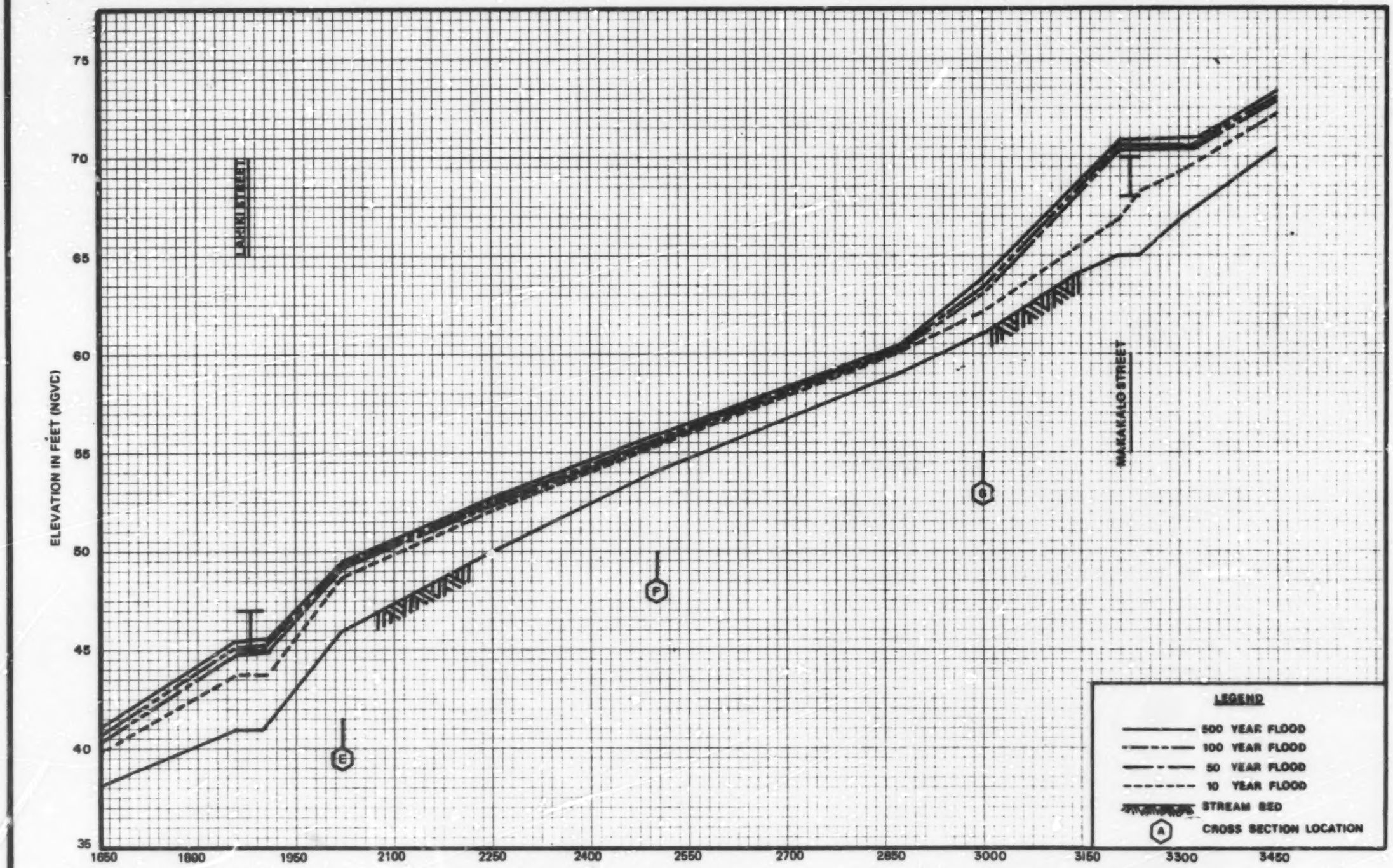

FLOOD PROFILES

WAIMANALO STREAM: STREAM D

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

37P

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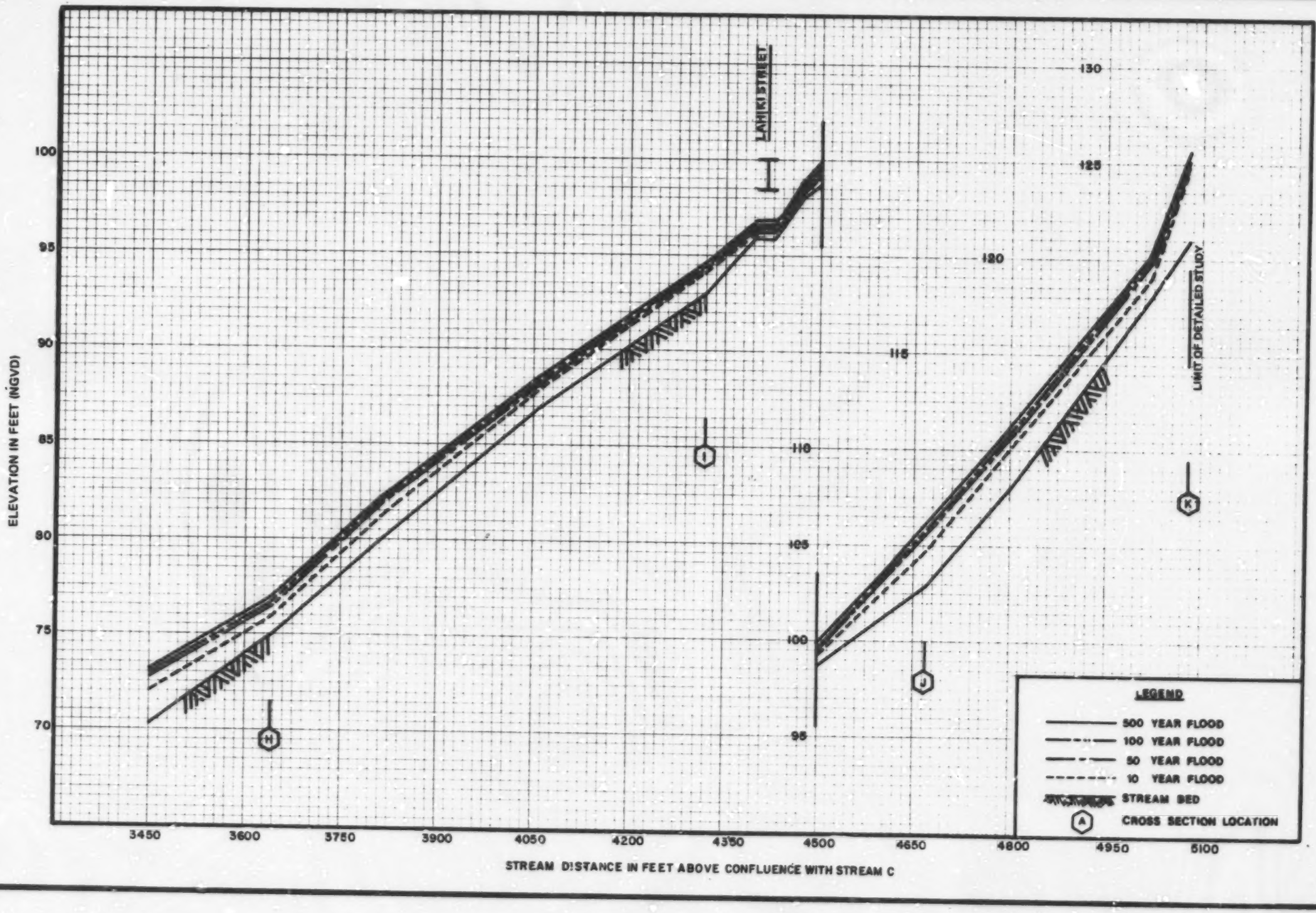

FLOOD PROFILES

WAIMANALO STREAM: STREAM D

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

38P

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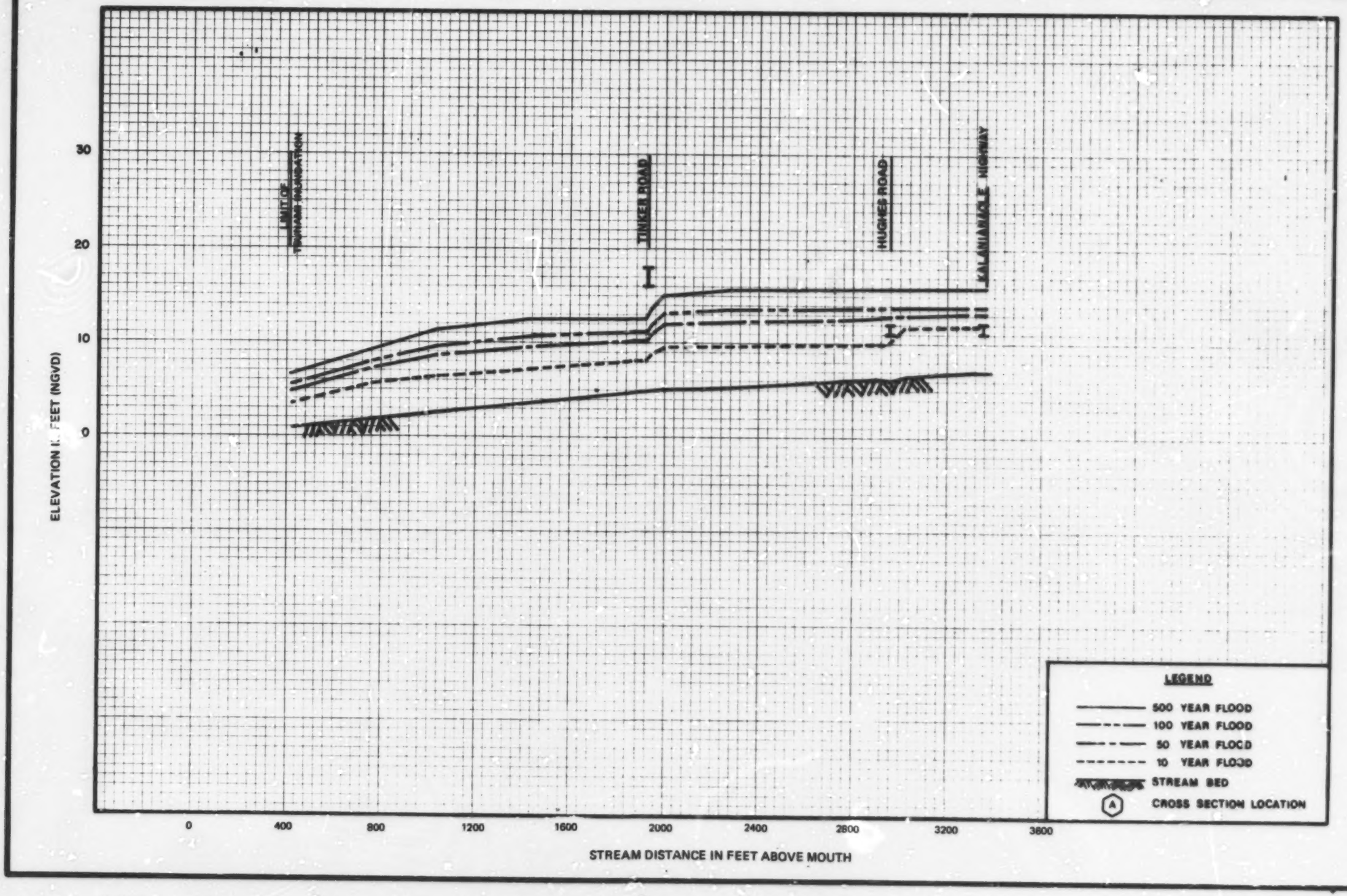

FLOOD PROFILES

WAIMANALO STREAM: INOAOLE STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

39P

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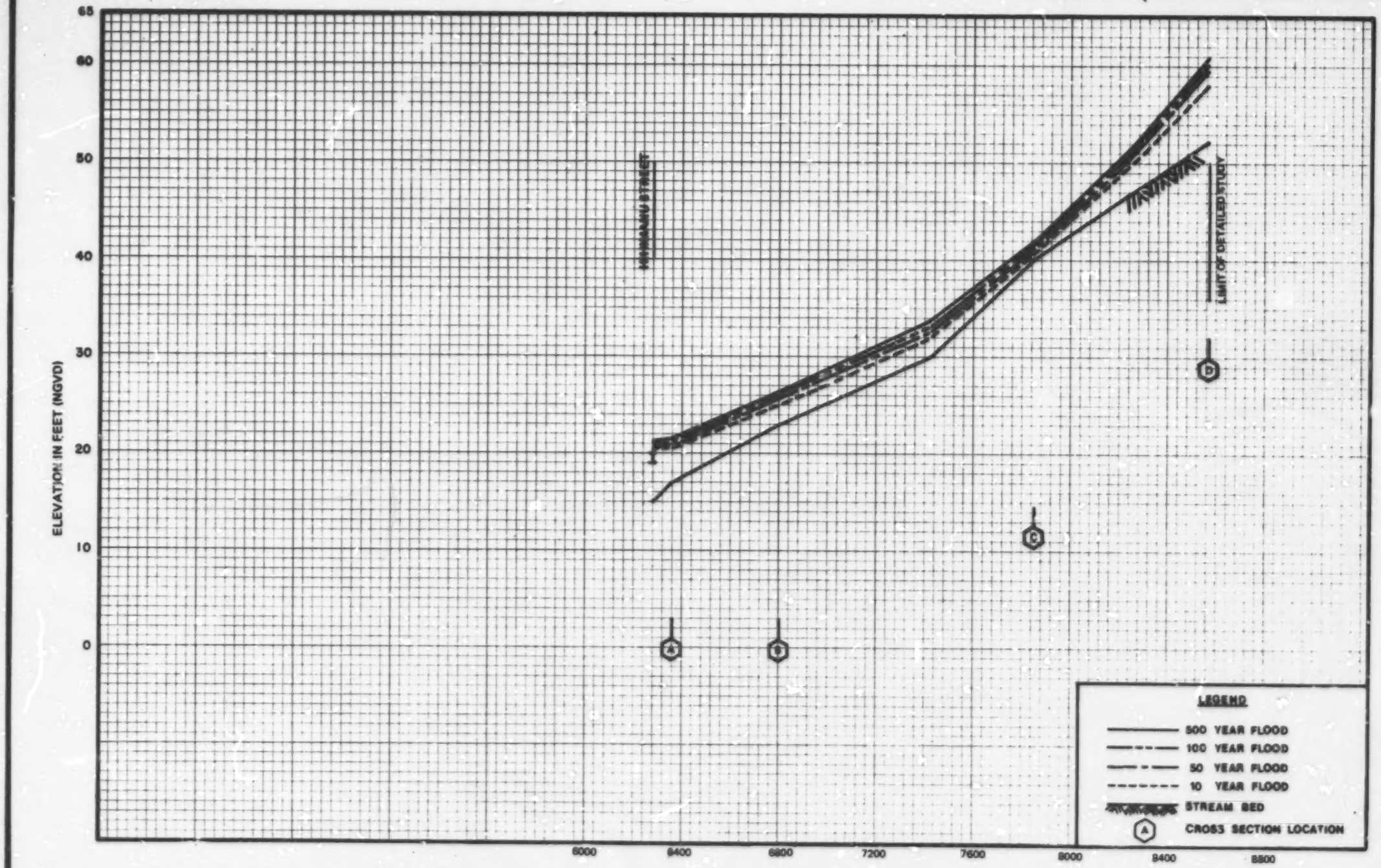

FLOOD PROFILES

WAIMANALO STREAM: INOAOLE STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

40P

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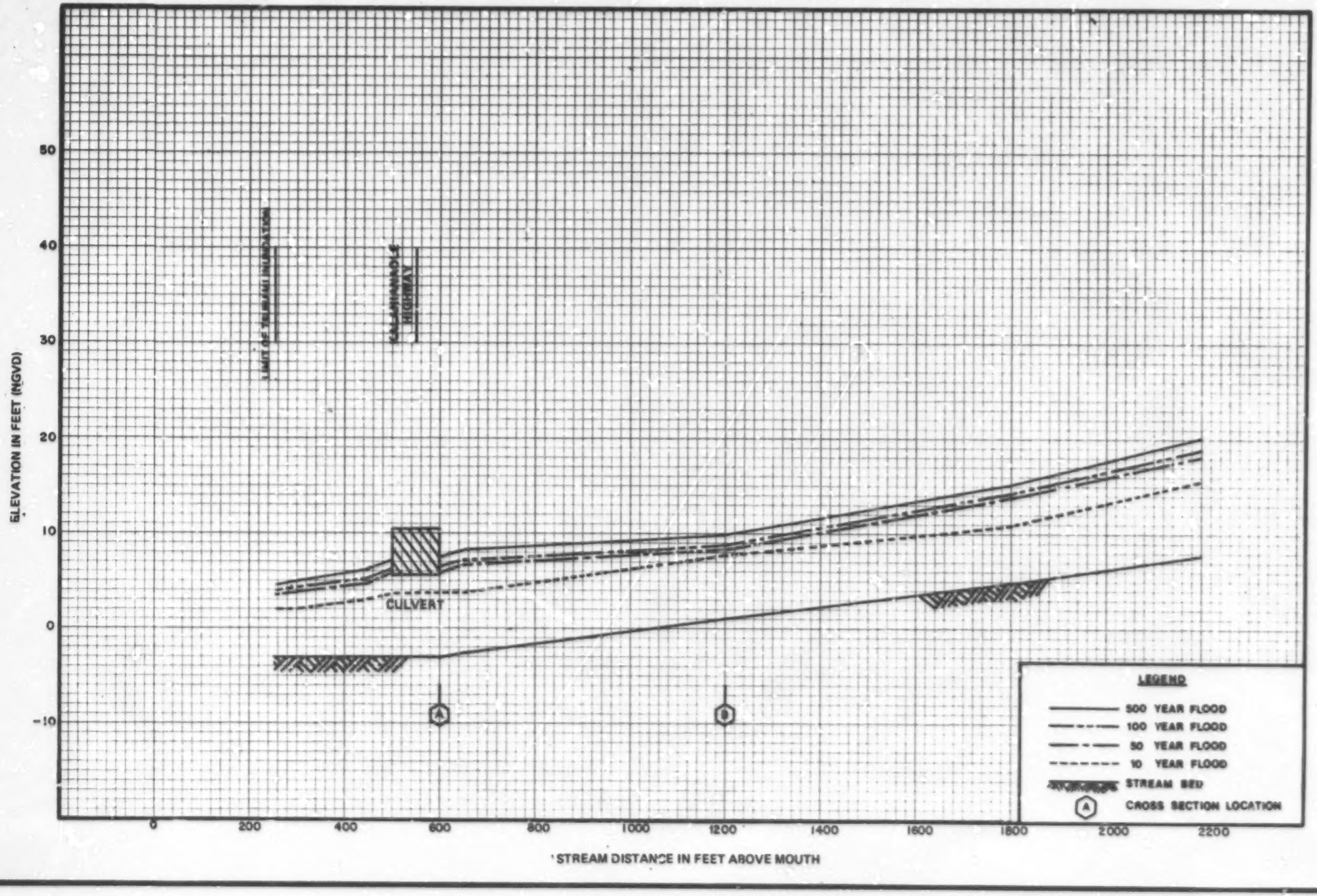

FLOOD PROFILES

WAILUPE STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

41P

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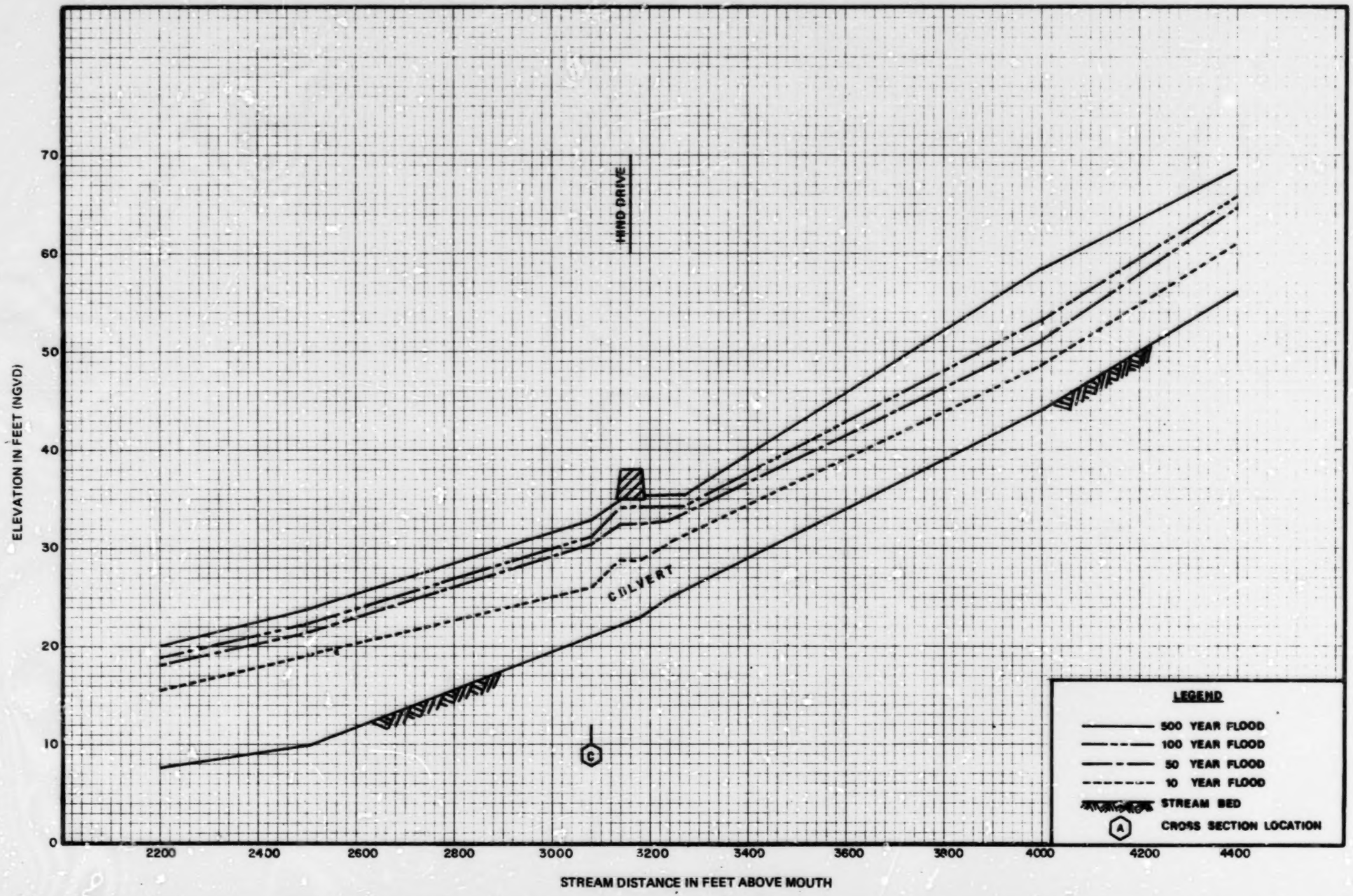

FLOOD PROFILES

WAILUPE STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

42P

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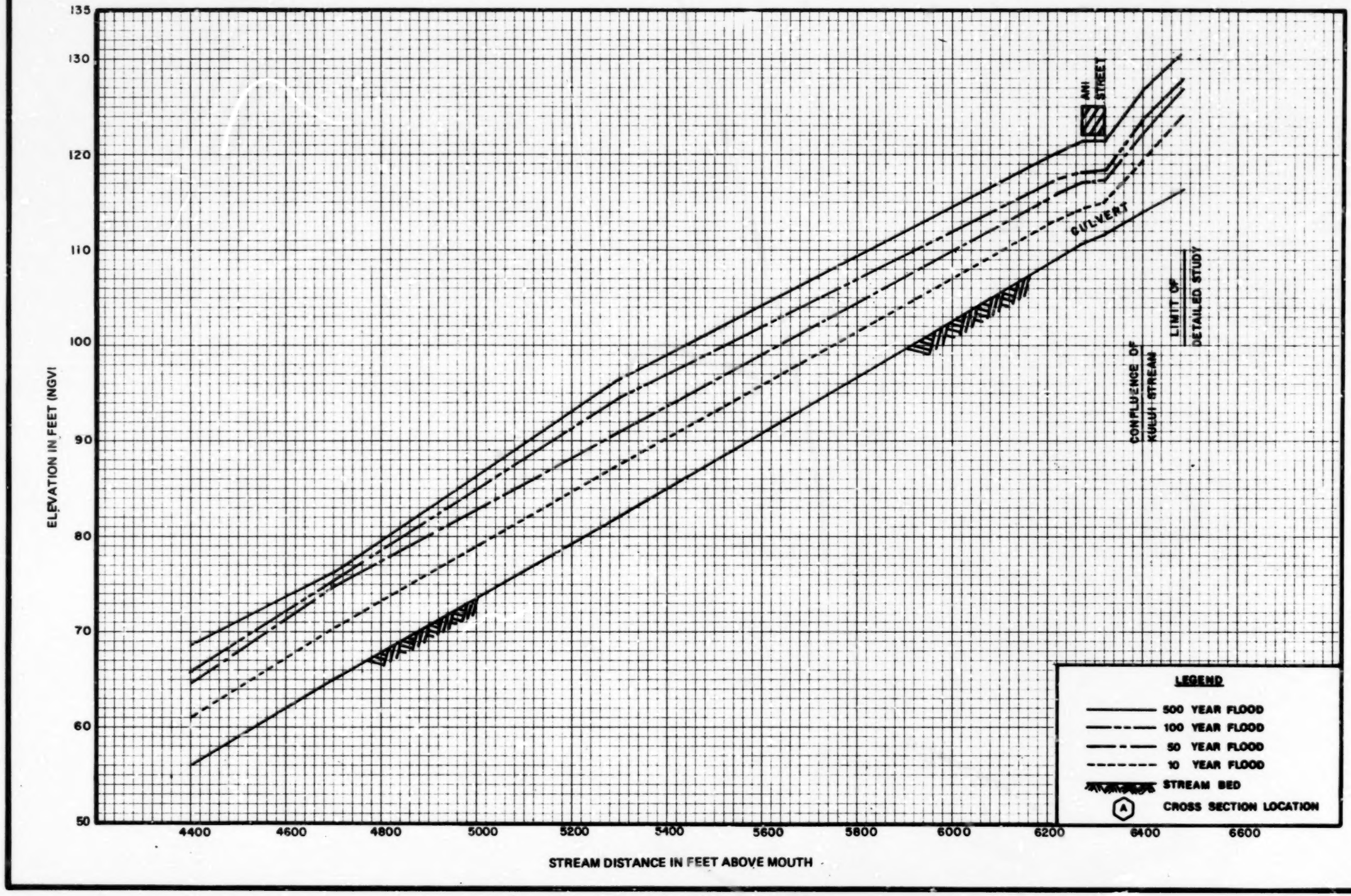

FLOOD PROFILES

WAILUPE STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY AND COUNTY OF HONOLULU, HI

43P

BEST COPY AVAILABLE